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MODULAR SYSTEM CONTROL DEVELOPMENT MODEL (MSCDM). USERS MANUAL.(U)
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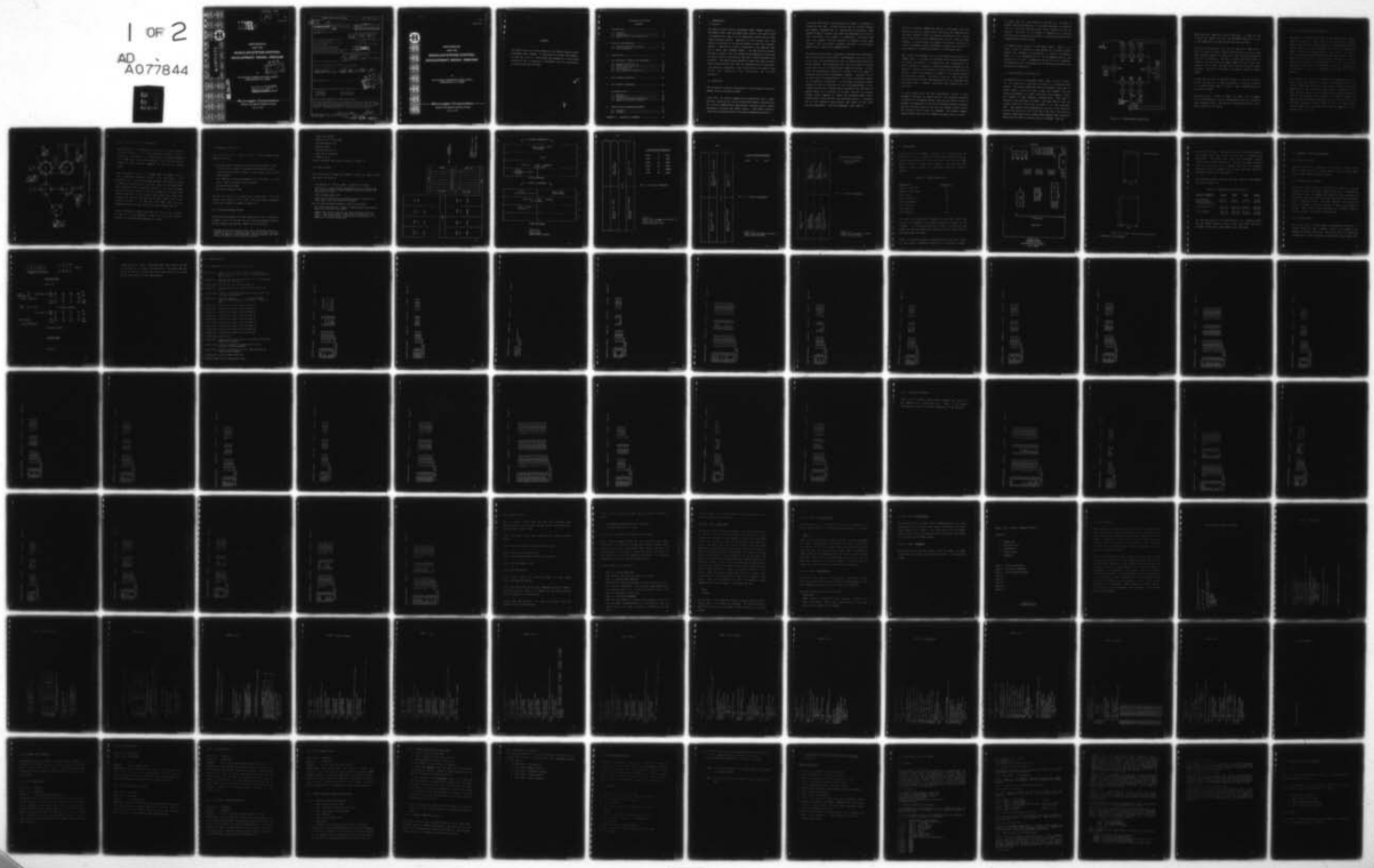

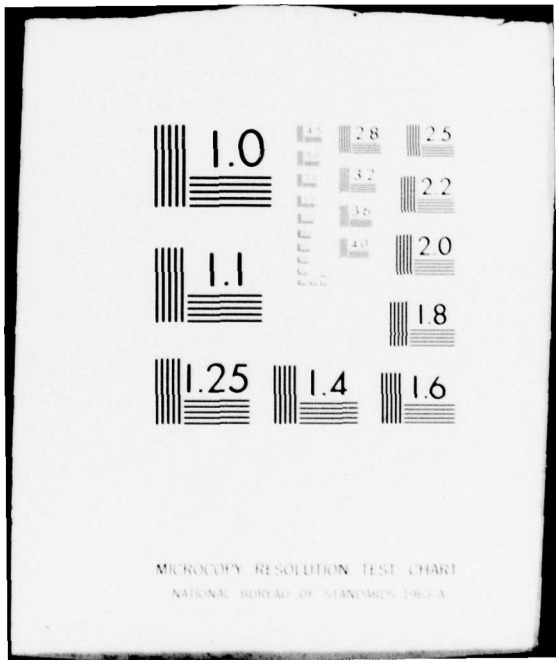
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November 1979

LEVEL II

USER MANUAL
FOR THE
MODULAR SYSTEM CONTROL DEVELOPMENT MODEL (MSCDM)

for

THE DEFENSE COMMUNICATIONS AGENCY
WASHINGTON, D.C. 20305

Burroughs Corporation
Federal and Special Systems Group
Paoli, Pa. 19301

UNCLASSIFIED

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Tech Control
Fault Isolation
Fail Soft System

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This manual provides the necessary information to start up (load) the MSCDM and to modify specified operating parameters of the system. The user language is totally specified and a complete listing of all user language features is presented. The MSCDM acceptance test procedures are also included.

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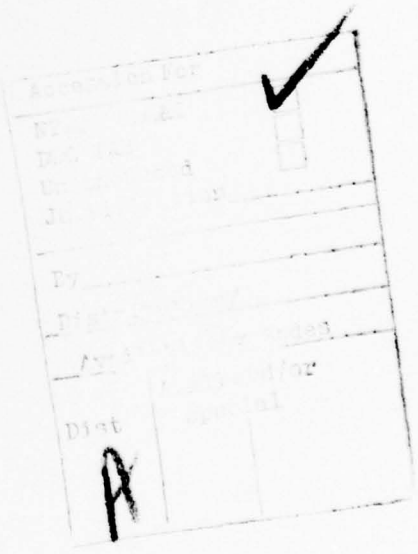
FOREWORD

This publication is the User Manual for the Modular System Control Development Model (MSCDM). It describes the system, each capability and how to use it. This manual was prepared by the Burroughs Corporation and is submitted in accordance with the requirements of Contract DCA 100-76-C-0083.



USER MANUAL FOR MSCDM

CONTENTS

1. INTRODUCTION

1.1 Purpose

The Modular System Control Development Model (MSCDM) Feasibility Development Model (FDM) developed under Contract DCA 100-76-C-0083 is implemented as loop 5 of the Exploratory System Control Model (ESM) Multiloop Network. Operation of the original three loop system is described in the ESM User Manual of March 1977 (Document 66143-1). Operation of loop 4 is described in the ESMD User Manual of March 1978 (Document 66146). The ESM Multiloop Network provides a flexible tool for simulating and comparing a wide range of system control architectures and their related procedures and protocols. The ESM has been designed to model the class of system control architectures that have the characteristics of decentralized operation, modularity, ease of modification and upgrade capability, high reliability, high survivability and fail-soft operation.

1.2 Background

The following is based on information in the Statement of Work for MSCDM, Contract DCA 100-76-C-0083.

Since 1974, the Defense Communications Engineering Center (DCEC) has been investigating various distributed computer architectures for various communication applications including digital speech processing, switching and system control. Distributed architectures that are designed from a functional decomposition point of

view seem particularly interesting with respect to modularity, reliability and cost. Various efforts such as the Bolt Beranek and Newmans' PLURIBUS and the Carnegie-Mellon University C.mmp advanced computer concepts have shown the advantages of a distributed architecture with respect to modularity, reliability and cost. For example, fail-soft behavior is possible, using these concepts, that will permit necessary functions to continuously operate even if some of the components fail.

The advent of Large Scale Integration technology and microprocessors in particular has now made it advantageous, cost wise, reliability wise, and maintainability wise, to design distributed computing systems. Microprocessors exist that can be used to replace wired logic as well as sophisticated computing systems. In fact there are microprocessor systems on the market that are capable of replacing sophisticated minicomputer systems. Currently one of the main uses of microprocessors in the area of automatic control is the design of controllers. It now seems particularly advantageous for DCA to investiage the use of microprocessors in distributed architecture concepts which incorporate the functions of System Control as it pertains to the DCS. The DCS is a general purpose system composed of leased and Government-owned transmission media, relay stations, and switching centers. It embraces all of the long-haul point-to-point DCS assets of the three Military Departments. The DCS encompasses a wide range of

services, including command and control, intelligence, and early warning, as well as administrative and logistical communications. The major networks within the present DCS provide voice, secure voice, and secure record communications service. Each of these networks is characterized by a degree of automatic switching, a military precedence system, world-wide trunking, and service to a large community of defense and other U. S. Government users.

The control and management of a large communication system is a complex task. It includes the continual monitoring and assessment of system performance, the formulation and implementation of control actions in response to system performance degradation, the detection, isolation and restoral of faults and the generation of analyses, reports and displays in support of the system planning and engineering process. In order to carry out these functions, system controllers require ADP equipments which are geographically distributed and in constant interaction and communication with each other.

In recent years there has been considerable interest in more automated techniques for system control. The Assistant Secretary of Defense for Telecommunications (now known as DTACCS) stated in guidance for submission of the FY 75-79 program objective memorandum that the DCA effort in the area of automatic system control and technical control should be expanded. The Defense Communications System (DCS) must be a highly survivable entity in order

to insure that its vital mission is carried out. In order to enhance system survivability, it is highly desirable to decentralize the real-time monitoring and control process as much as possible. Therefore, if the system is fragmented the remaining system control elements will be able to effectively operate their fragmented portions of the DCS.

The MSCDM Project consists of two major phases. Phase I is a study in order to determine a near optimal set of System Control modules and recommend an architecture to connect the modules. Phase II is an implementation of the recommended modules and architecture in order to demonstrate feasibility of the approach. The MSCDM along with the ESM make up the ESM Multiloop Network for System Control Simulation.

1.3 System Elements and Connectivity

The MSCDM Feasibility Development Model (FDM) is given in Figure 1-1. The loop will be referred to as loop 5 in the ESM Multiloop Network. The default MSCDM functions are assigned to each node as shown; however, since each node is down line loadable from the program development unit (PDU), functions can be mapped to hardware modules in many different configurations. Each node is assigned a node designator as shown. Each node owns at least one logical identifier (LID) which is equal to its node designator (ND). Thus packets can be addressed to any node in the system by setting the destination LID to the ND of that node. The indirect method of addressing using LID/functional address (FAD) conversion tables used for ESM will also be used in the MSCDM. Thus any

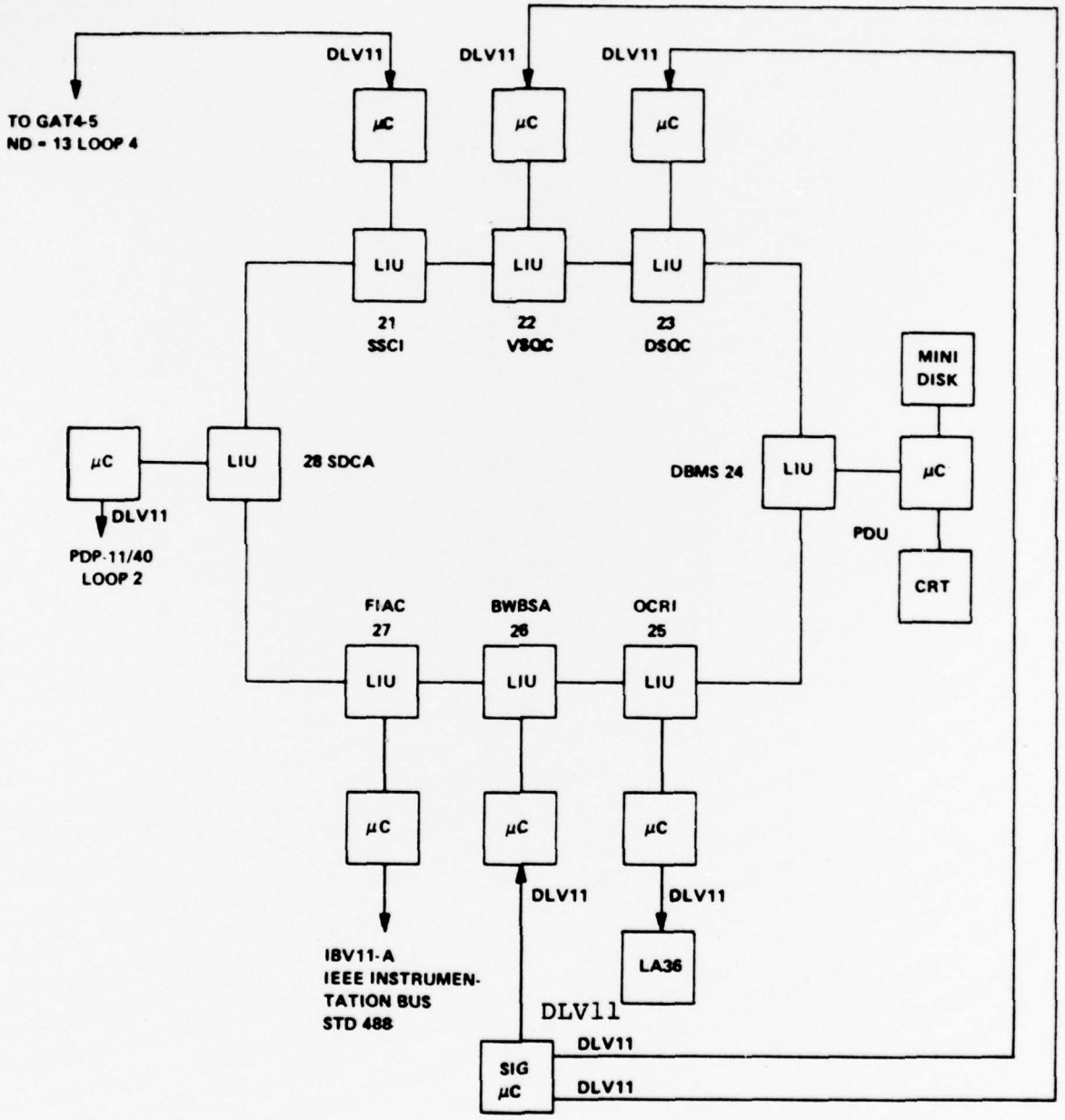


Figure 1-1. MSCDM System Configuration

MSCDM node can communicate with an ESM node. In addition, the terminal node (ND=25) will have the ESM ATTACH capability so that it can communicate with ESM terminals and host processors.

The Loop Interface Units (LIU) are the same as in ESMD Loop 4. Thus the loop is actually a double loop configuraion with the same ESMD loop-back capability. The UC's are DEC LSI-11 microcomputers with 32k x 16 memories. The PDU is a PDP 11V03 system which is housed in its own cabinet with power supply and can be used independently of the loop. The PDU can be used as a general purpose processor. The loop is contained in a separate cabinet with power supply.

An IEEE 488 interface is provided at node 27. Node 28 contains a serial interface that is cable connected to the serial interface in the PDP11/40 HSTB (ND=5) in loop 2. Thus the MSCDM appears as a terminal to HSTB.

Simulated inputs to nodes 22 (VSQC), 23 (DSQC), and 26 (BWBSA) will be generated by an LSI-11 microprocessor used as a simulated input generator (SIG). The SIG will contain three serial interaces in nodes 22, 23, and 26.

1.3.1 Relationships with ESM Loops 1-4

The MSCDM is integrated as loop 5 of the ESM Multiloop Network shown in Figure 1-2. Loop 5 and its nodes can operate independently from the other network loops or in conjunction with other network loops, via a loop interface node known as a gateway node. Nodes 13 and 21 are gateway nodes in loop 4 and 5. In loop 5, node 21 recognizes and accepts packets destined for other nodes on loops within the network. Node 21 passes the packets to gateway node 13 over a 9600 baud asynchronous line. Loop 5 also has a connection (node 28) to the PDP11/40 in loop 2. The node 28 microprocessor appear as a terminal to the PDP11/40 operating system.

Any terminal on a loop has the capability to communicate with any other node in the network via use of the ATTACH function. The command "ATTACH XX" entered at a any terminal denotes the logical address of the node to which the user wishes to communicate. The nodal software interprets the command and directs that terminal's input to the selected nodal processor. For example "ATTACH 16" typed at node 25 terminal enables the user to communicate with the B776 Host processor on loop 4, node 16. The user should attach terminal nodes only to processors which have the capability to communicate with a terminal.

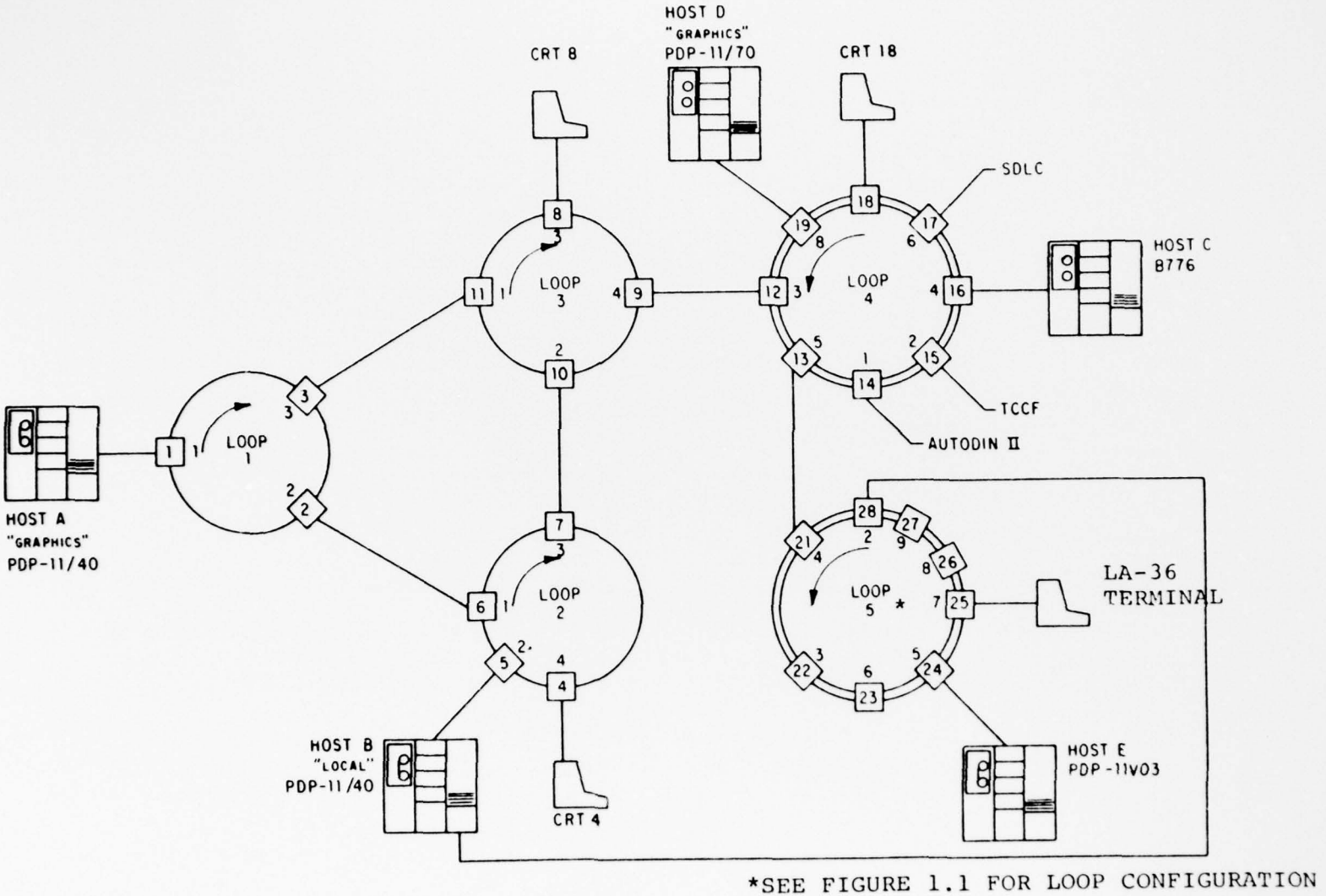


Figure 1-2. ESM Multiloop Network

1.3.2 Loop 5 Module Intercommunication

Any nodal module can communicate with any other module, however, the nodal software for the MSCDM application defines the flow of information in the system. The OCRI terminal is normally ATTACHED to the DBMS which runs the User Language. The other ESM terminals communicate with the User Language via the loop 4-5 gateway (SSCI).

The SIG provides inputs to the VSQC, DSQC and BWSBA, which in turn, communicate simulated faults to the FIAC module. FIAC generates event reports to the OCRI and DBMS. The PDP11/40, which is shared by loops 2 and 5, generates inputs to the SDCA, which then generates switch saturation reports to the OCRI and DBMS. The program SDCA5, which is run on the PDP11/40 by typing "RUN SDCA5", generates the SDCA inputs, sends them over a 9600 baud asynchronous interface via node 28 and also outputs them to the terminal attached to the PDP11/40. The DBMS, OCRI and FIAC communicate with the other loops via the SSCI gateway, node 21.

An LA36 DECWRITER is used as the OCRI hard-copy terminal attached to node 25. A VT52 DECSCOPE is used as a local CRT terminal connected to the Program Development Unit (PDU).

2. PHYSICAL CONFIGURATION

The MSCDM FDM loop 5 system consists of the following major physical entities:

- One loop cabinet containing 7 of the 8 LSI-11 nodes, 8 loop interface units (LIUs), 1 simulated input generator (SIG), clock generator/buffer circuits, power supply, and operator control panel.
- One PDP11V03 Program Development Unit containing 1 LSI-11 node, 1 LSI-11 processor, and a minidisk.
- One CRT terminal, VT52
- One printer terminal, LA36

The LIU for node 24 is attached by a ribbon cable to the PDU cabinet which makes up the 8th node. The card layout arrangement in the loop 5 cabinet is shown in Figure 2-1.

2.1 Program Development System

The Program Development Unit (PDU) makes up node 24. Software development is done on the PDU for all eight microcomputer modules. The PDU hardware and software elements are listed below:

- SRRVXRRA-LA System with LSI-11 CPU, 16k x 16 MOS RAM, bootstrap loader, serial line interface cable, dual drive floppy disk with 512k byte capacity, disk interface, cabinet assembly, LA36 DEC-Writer, and RT-11 real-time operating system.

- QJ925 -AY FORTRAN
- MSV11-CA 16k x 16 MOS RAM
- BA11-ME Expander Box
- BCV1B-02 Cable
- VT52-AA DECScope CRT
- DLV11 Serial Interface
- DC05M-2C Cable

The PDU backplane card layout is given in Figure 2-2.

2.2 Nodal Hardware

The following DEC hardware as shown in Figure 2-3 make up each node other than node 24:

- KD11-HD-LSI-11/2 CPU plus 32KW x 16 RAM on two boards
- LIU-LSI-11 interface (BLIUI) implemented using a DCK11-AD DMA Bus Interface (Refer to MSCDM Hardware Maintenance Manual for description of BLIUI).
- MRV11-AA PROM Loader Card
- DLV11 Serial Interface Unit except for node 27 (Figure 2-4) which uses a IBV11-A Instrument Interface

The following Burroughs hardware is used at each node:

- LIU (Loop Interface Unit) (Refer to MSCDM Hardware Maintenance Manual for description of BLIUI).
- Common loop circuits such as loop clock generator and clock buffer. The SIG processor is not directly connected to the loop; it has 3 DLV11 Serial Interface Units connecting it to Nodes 22, 23 and 26 (Figure 2-5).

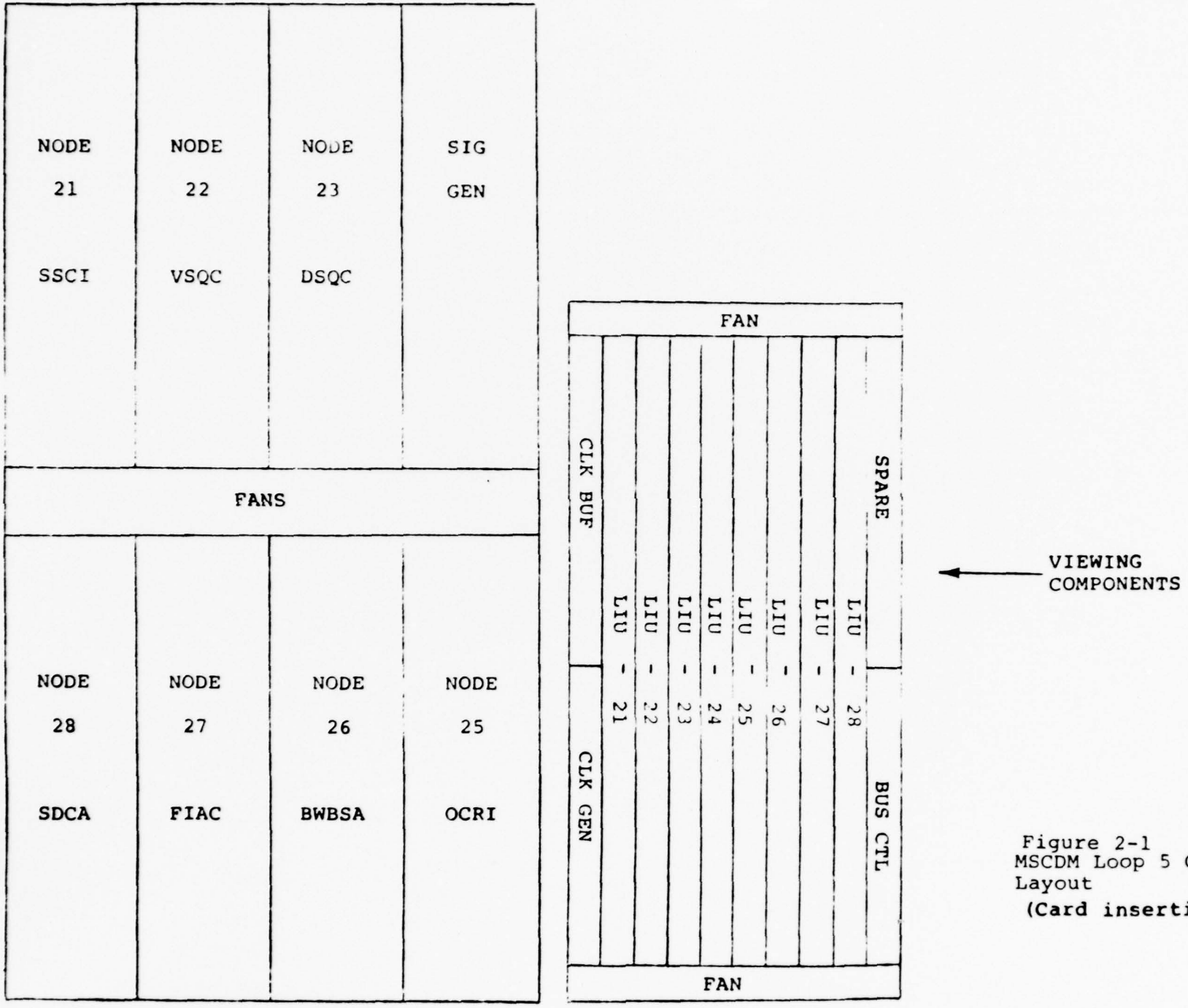


Figure 2-1
MSCDM Loop 5 Cabinet Layout
(Card insertion view

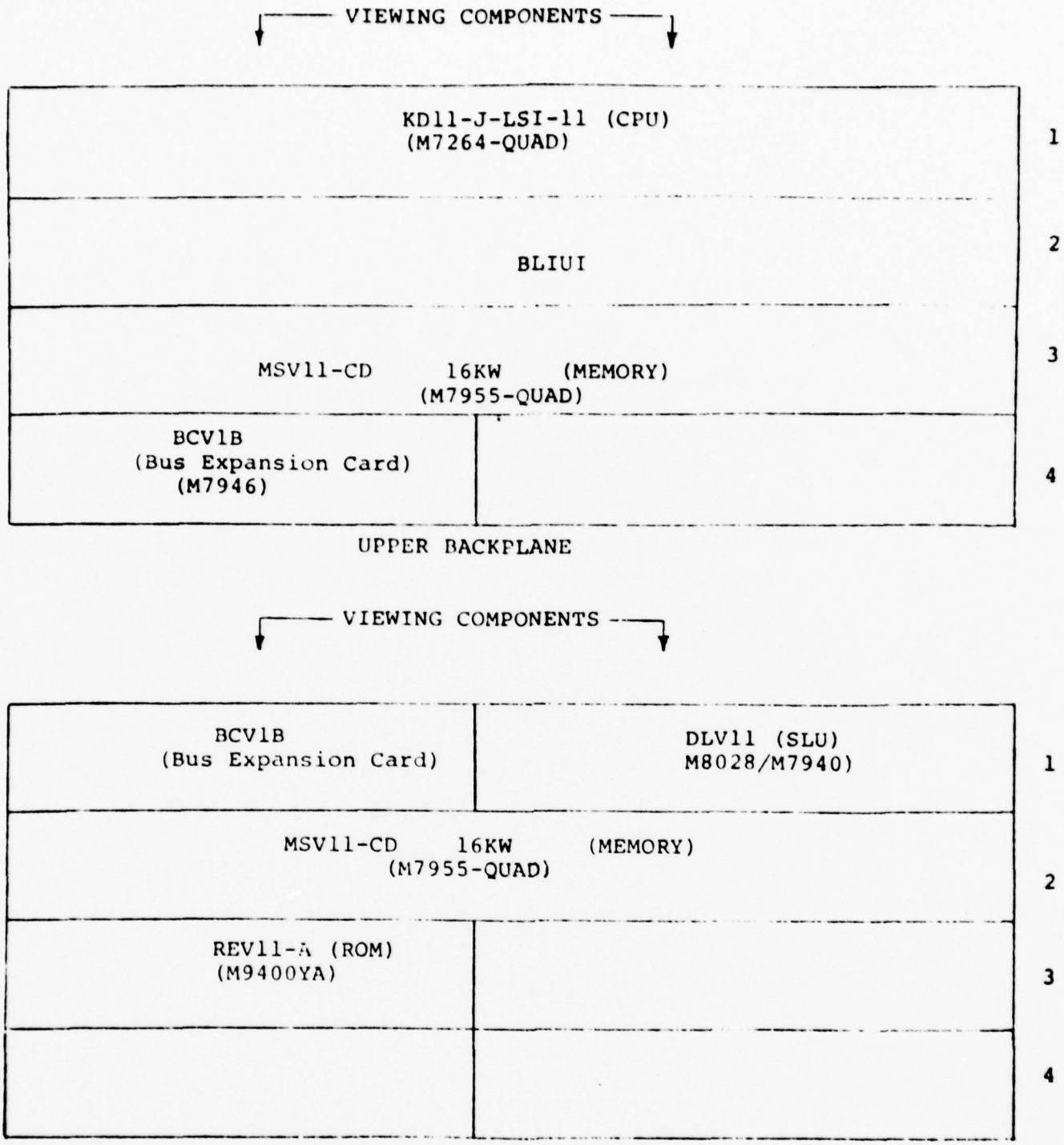
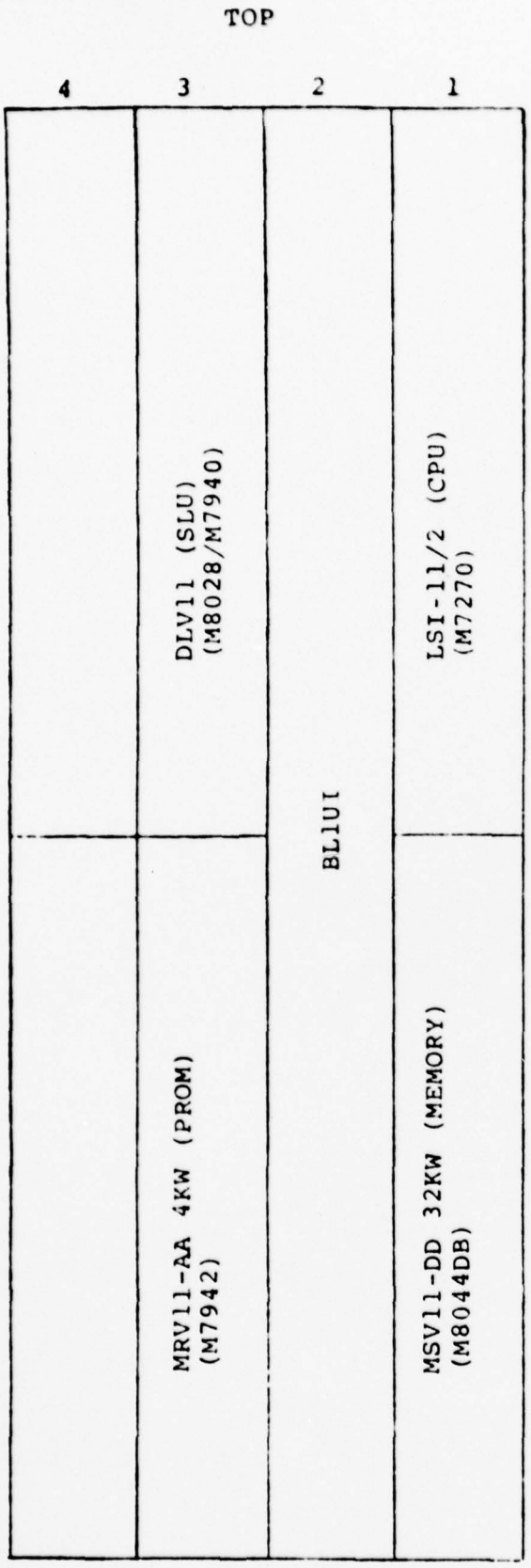


Figure 2-2
PDP 11/VO3
Node 24 PDU
Logic Card Placement

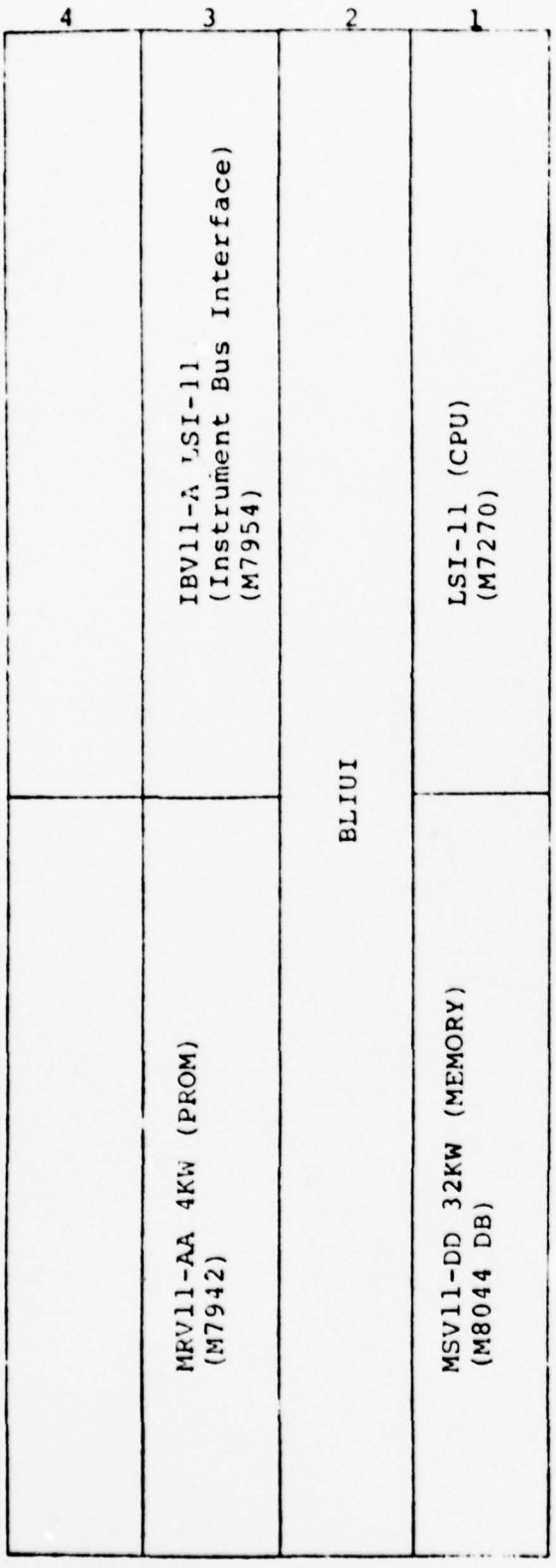


MICROCOMPUTER BACKPLANE

Node	21	SSCI
Node	22	VSQC
Node	23	DSQC
Node	25	OCRI
Node	26	BWBSA
Node	28	SDCA

← Viewing Components

Figure 2-3
Logic Card Placement for Nodes 21, 22, 23, 25, 26, 28
(Card insertion view)



MICROCOMPUTER BACKPLANE

Node 27 FIAC

← VIEWING COMPONENTS

Figure 2-4
Logic Card Placement for Node 27
(Card insertion view)

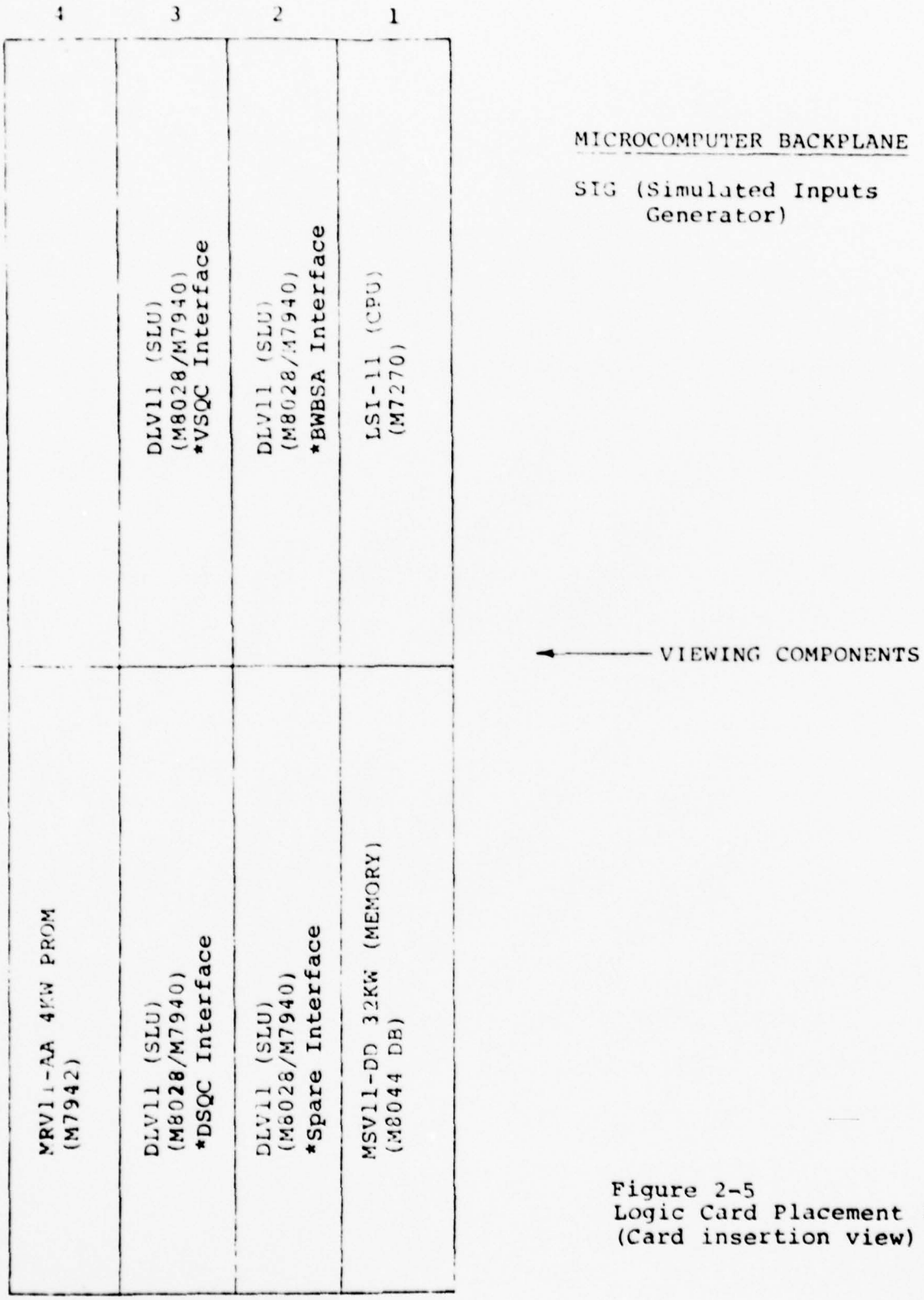


Figure 2-5
Logic Card Placement for SIG
(Card insertion view)

3. INSTALLATION

Installation of the MSCDM is concerned with installing the PDP 11V03 PDU, the Loop 5 cabinet, the VT52 CRT, and LA36 terminals, and interfacing these units with each other, with the loop 4 ESMD cabinet, and with the PDP 11/40 in loop 2. A typical floor plan layout is shown in Figure 3-1. The system cables are listed in Table 3-1.

Table 3-1 MSCDM System Cables

Description	Length (ft.)
Loop #5 to Loop #4	20
Node 28 to PDP 11/40	30
VT52 to PDU	10
LA36 to Node 25	10
PDU to LIU-Node 24	10
SIG to Node 22	3
SIG to Node 23	3
SIG to Node 37	4

All cables are equiped with connectors at each end. These connectors are compatible with mating connectors provided on the equipment. All cables are either flat ribbon or twisted pair and, except for the SIG cables which reside within the loop 5 cabinet, are routed under the floor.

Figure 3-2 shows the physical characteristics of the loop 5 cabinet. The cabinet is mounted on casters, but is expected to remain

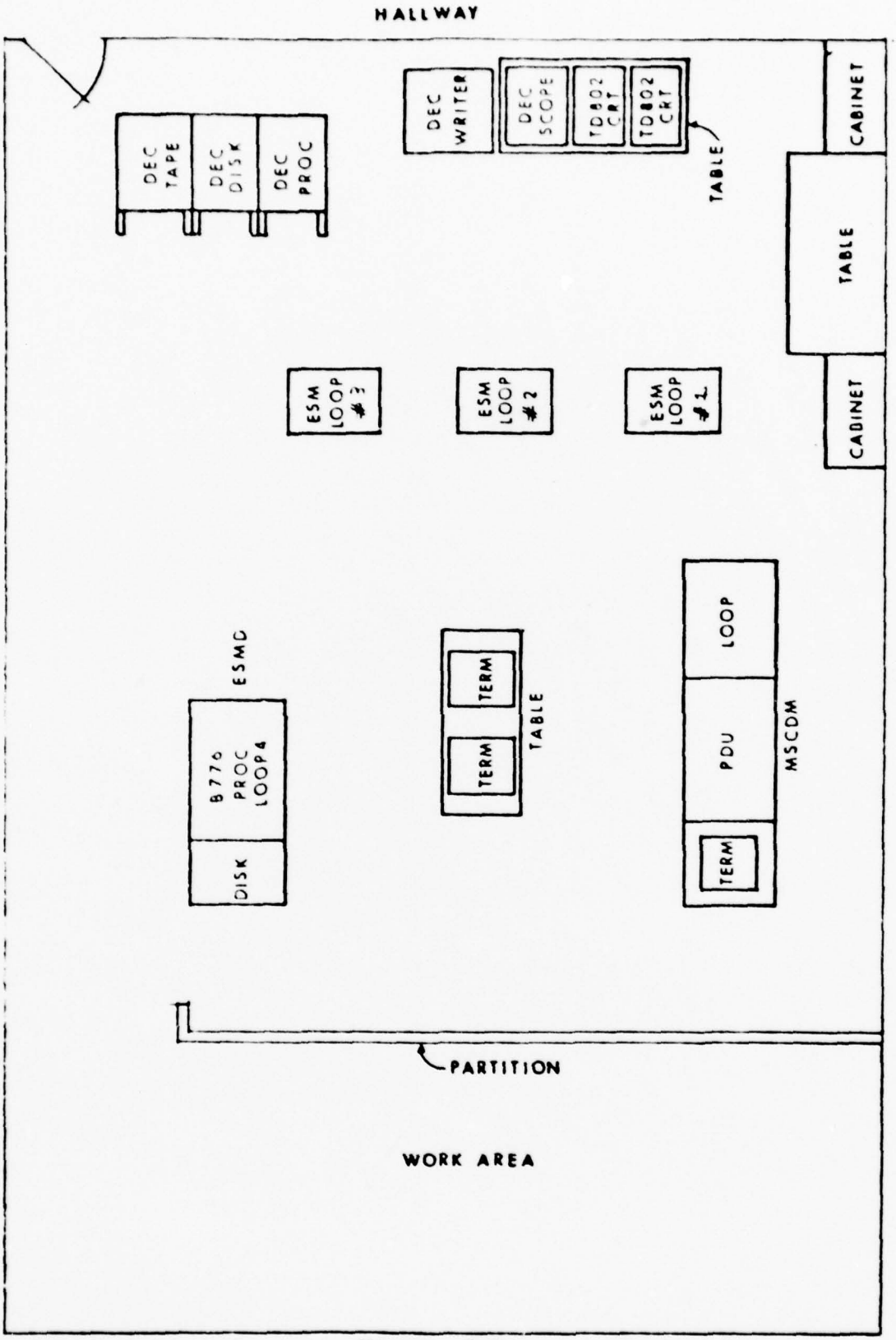
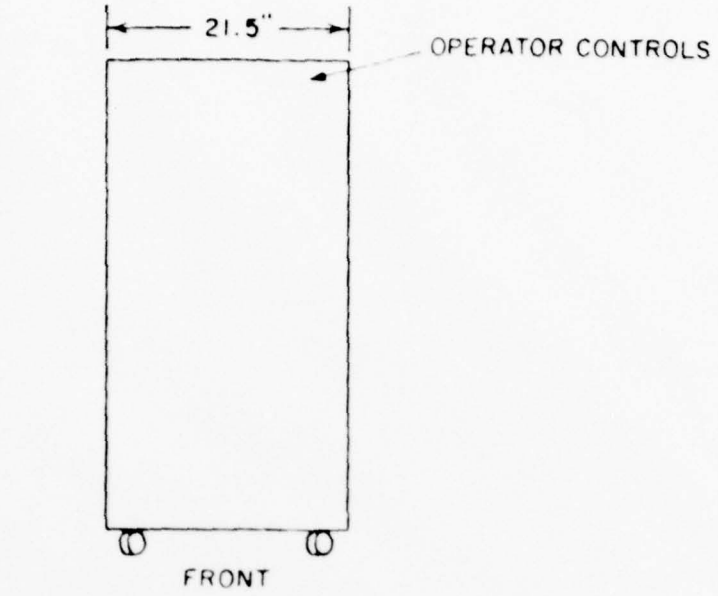


Figure 3-1
ROOM 1A22
FLOOR PLAN
EXPLORATORY SYSTEM CONTROL
MODEL ROOM



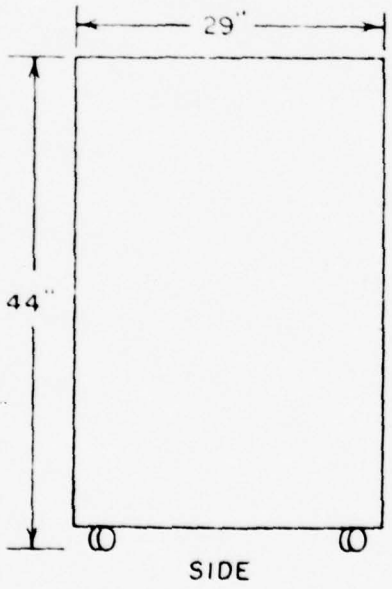


Figure 3-2. Loop 5 Physical Characteristics

ALL DIMENSIONS ARE APPROXIMATE

relatively stationary. The cabinet should be oriented as shown on the example floor plan (Figure 3-1) for ease of operation and maintenance. Maintenance and installation procedures require removing the lift-off side panels. Note that the panel retaining bolts at the bottom of the cabinet must first be loosened. Maintenance access clearance of at least three feet should be provided on each side of the cabinet.

The physical characteristics of the PDU, DECwriter and DECscope are given in Table 3-2.

Table 3-2 MSCDM Physical Characteristics

Physical Component	Height	Depth	Width	Weight
PDU H 984-BA Computer Cabinet (including casters)	64 cm (25.5 in)	72 cm (28.1 in)	54 cm (21.5 in)	82 kg (180 lb)
LA 36 DECwriter II	85.1 cm (33.5 in)	60.7 cm (24.0 in)	69.9 cm (27.5 in)	46.4 kg (102 lbs)
VT 52 DECscope	36.0 cm (14.1 in)	69.0 cm (27.2 in)	53.0 cm (20.9 in)	20 kg (44 lbs)

The VT52 may reside on the PDU cabinet or on a separate table. The four MSCDM components (Loop 5, PDU, LA36, VT52) each use a standard 3 prong plug, single phase 60 Hz, 115V power.

4. OPERATING CONTROLS AND PROCEDURES

4.1 Operator Controls

Operator controls are contained on the Operator Control Panel which resides outside the Loop-5 cabinet and the Utility Panel which resides inside the Loop-5 cabinet.

4.1.1 Operator Control Panel

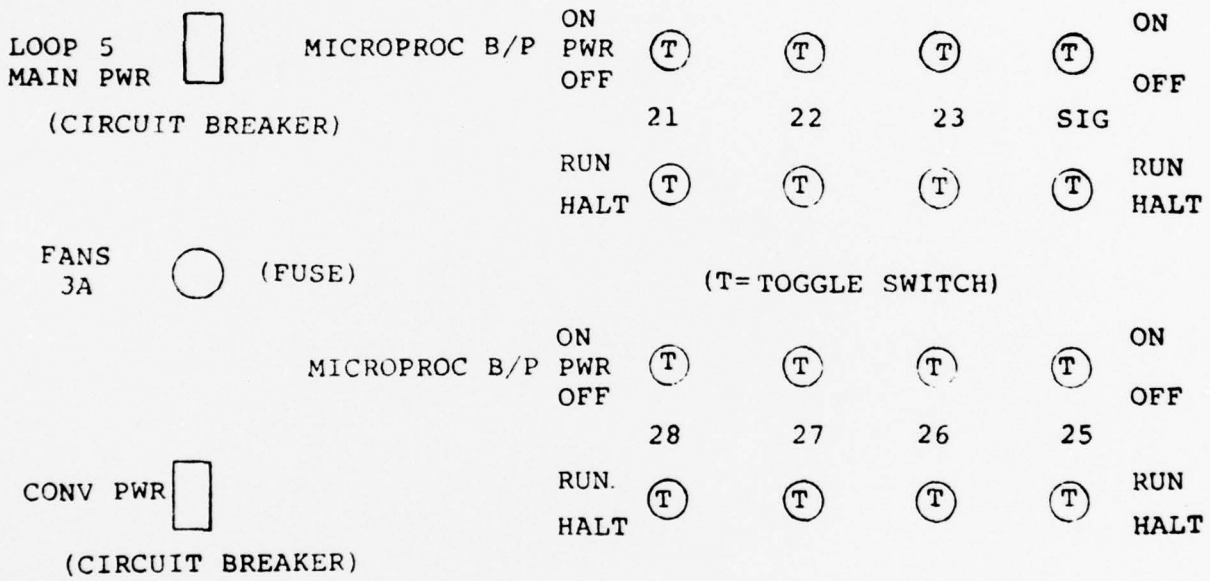
The Operator Control Panel is illustrated in Figure 4-1. The ON pushbutton switch turns loop 5 power ON and OFF. It glows white when power is ON. The CLEAR switch clears all eight processors in the cabinet such that they all go into load mode (lift up plastic cover to operate switch). The eight indicator lights glow red when the processor is running and are off when the processor is halted. Under normal system operation all necessary operator controls reside on the Operator Control Panel.

4.1.2 Utility Panel

The Utility Panel is mainly used for maintenance functions. It resides inside the Loop 5 cabinet; access to the panel is by opening the cabinet front door. The Utility Panel is illustrated in Figure 4-2. Circuit breakers are provided for main cabinet and

OPERATOR PANEL

Figure 4-1



UTILITY PANEL

Figure 4-2

convenience outlet power. Individual power and run/halt switches are provided for the eight microprocessors. The EXT-CK BNC connector is used for external loop clock input when the top switch on the clock board is in the down position.

4.2 System Diskettes

4.2.1 MSCDM system diskettes are described below.

Diskette #1: Contains the Loop Loader Utility and the RT-11 operating system. This diskette normally resides in drive 0 (DX0:).

Diskette #2: Contains the task files for Nodes 21 - 27 (excluding Node 24) and for the SIG

Diskette #2A: Contains the task files for Node 28.

Diskette #3: Contains DBMS run file and S/J OS and nodal task file.

Diskette #3A: Contains the message display file, and status file for Node 24 execution.

Diskette #4: Used for linking. Contains FORTRAN compiler, MACRO Assembler and libraries. Runs in DX0:

Diskette #5: Contains the source files for Node 21.

Diskette #6: Contains the source files for Node 22.

Diskette #7: Contains the source files for Node 23.

Diskette #8: Contains the source files for Node 24.

Diskette #9: Contains the source files for Node 25.

Diskette #10: Contains the source files for Node 26.

Diskette #11: Contains the source files for Node 27.

Diskette #12: Contains the source files for Node 28.

Diskette #13: Contains the source files for the SIG.

Diskette #14: Scratch disk.

Diskette #15: Contains the source files for the Loader Utility and PROM Loader programs.

Diskette #16: Contains diagnostic programs for the LSI-11 processor and loop hardware.

Diskette #17: Contains miscellaneous files, IEEE interface and other special programs.

Diskette #18: Contains DBMS Linker DX0:

Diskette #18A: Contains DBMS Object files.

```
decwriter program:     DISK1.DIR     23-Jul-79     11:33:25     Page 001


23-Jul-79
DXMNFB.SYS      97 18-Oct-78      TT     .SYS       2 18-Oct-78
DX     .SYS      2 18-Oct-78      NL     .SYS       2 18-Oct-78
MACRO  .SAV     45 18-Oct-78      STARTF.COM        1
PIP    .SAV     16 18-Oct-78      DIR    .SAV      17 18-Oct-78
DUP    .SAV     17 18-Oct-78      PGLOOP.SAV       30
EDIT   .SAV     21 18-Oct-78      LINK   .SAV      29 18-Oct-78
DUMP   .SAV      7 18-Oct-78      FORTRA.SAV     128 27-Dec-78
FDMLDR.SAV     32 27-Apr-79      DUMMY  .MAC       1
 16 Files, 447 Blocks
 33 Free Blocks
```

```
23-Jul-79
SIGGEN.LDA      36 22-May-79      NODE21.SAV      57 22-May-79
NODE22.SAV      74 22-May-79      NODE23.SAV      73 22-May-79
NODE25.SAV      65 22-May-79      NODE26-SAV      72 22-May-79
NODE27.SAV      75 22-May-79
 7 Files, 452 Blocks
28 Free Blocks
```

```
23-Jul-79
NODE28.SAV      72 22-May-79
 1 Files, 72 Blocks
 408 Free Blocks
```

```
decwriter program:     DISK3.DIR     23-Jul-79     11:34:54     Page 001


23-Jul-79
DXMNSJ.SYS      86 17-May-79      TT     .SYS       2 17-May-79
DX     .SYS      2 17-May-79      NL     .SYS       2 17-May-79
PIP    .SAV     16 17-May-79      DUP    .SAV      17 17-May-79
DIR    .SAV     17 17-May-79      STARTS.COM        1 17-May-79
NODE24.SAV      93 17-May-79
 9 Files, 236 Blocks
 244 Free Blocks
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23-Jul-79

BDSTAT.FOR	5	17-May-79	STAT .COM	1	17-May-79
BDSTAT.SAV	20	17-May-79	STATUS.MAS	40	17-May-79
MASDIR.DAT	1	17-May-79	MSGCON.FOR	3	17-May-79
MSGCON.SAV	19	17-May-79	MSGL .DAT	21	17-May-79
MSG .DAT	51	17-May-79	CRASH .COM	1	14-May-79
BACKUP.COM	1	14-May-79	DIR .DAT	9	17-May-79
DAT .DAT	32	17-May-79	CKTD .DAT	32	17-May-79
REPORT.DAT	9	17-May-79	TDIR .DAT	9	17-May-79
MASDAT.BAK	1	17-May-79	MASDAT.DAT	2	17-May-79
TNKD .DAT	32	17-May-79	CDIR .DAT	9	17-May-79
TDIR .OLD	9	17-May-79	TNKD .OLD	32	17-May-79
CDIR .OLD	9	17-May-79	CKTD .OLD	32	17-May-79
STATUS.DAT	40	17-May-79			

25 Files, 420 Blocks
60 Free Blocks

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decwriter program:     DISK4.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
DXMNFB.SYS      97 08-Feb-79      TT     .SYS       2 21-Feb-79
DX     .SYS      2 21-Feb-79      NL     .SYS       2 21-Feb-79
STARTF.COM       1 21-Feb-79      PIP    .SAV      16 21-Feb-79
DIR    .SAV     17 21-Feb-79      DUMP   .SAV       7 18-Oct-78
LINK   .SAV     29 21-Feb-79      SYSLIB.OBJ    203 27-Dec-78
 10 Files, 376 Blocks
 104 Free Blocks
```

```
01-Jul-79
NODAL1.OLD      10 23-Jul-79      NODAL2.OLD      17 25-Apr-79
NODAL .OLD       6 23-Jul-79      FDM    .OLD     41 25-Apr-79
NODAL .FOR       8 22-May-79      NODAL1.FOR      10 22-May-79
FDM    .MAC     41 21-May-79      COMP21.COM       1 23-Jul-79
LNK21 .COM       1 23-Jul-79
 9 Files, 135 Blocks
 345 Free Blocks
```

```
decwriter program:     DISK6.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
NODAL .OLD       7 04-Apr-79     NODAL1.OLD      10 04-Apr-79
VSQC  .OLD      15 16-Apr-79     FDM   .OLD      41 15-Apr-79
NODAL2.OLD      25 01-May-79     NODAL .FOR       8 22-May-79
NODAL1.FOR      17 22-May-79     VSQC  .FOR      13 22-May-79
FDM   .MAC      41 21-May-79     COMP22.COM       1 01-Jul-79
LNK22 .COM       1 01-Jul-79
 11 Files, 179 Blocks
 301 Free Blocks
```

```
decwriter program:     DISK7.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
NODAL .OLD       7 04-Apr-79      NODAL1.OLD      10 04-Apr-79
FDM   .OLD      41 12-Apr-79      NODAL2.OLD      25 01-May-79
DSQC  .OLD      13 14-May-79      NODAL .FOR       9 21-May-79
NODAL1.FOR      17 22-May-79      DSQC  .FOR      12 22-May-79
FDM   .MAC      41 21-May-79      COMP23.COM       1 01-Jul-79
LNK23 .COM       1 01-Jul-79
 11 Files, 177 Blocks
 303 Free Blocks
```

```
decwriter program:     DISK8.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
M2000 .OLD       6 22-May-79      M4000 .OLD      22 22-May-79
FDM   .OLD      40 22-May-79      NODAL .OLD       9 22-May-79
NODAL1.OLD      18 22-May-79      M0000 .OLD      19 22-May-79
M1000 .OLD       6 22-May-79      M3000 .OLD       6 22-May-79
M5000 .OLD      21 22-May-79      M6000 .OLD       8 22-May-79
COMP2 .COM       1 17-May-79      COMP2A.COM       1 17-May-79
COMP1 .COM       1 17-May-79      M2000 .FOR       6 17-May-79
M4000 .FOR      22 17-May-79      NODAL .FOR       9 17-May-79
NODAL1.FOR      18 17-May-79      M0000 .FOR      19 17-May-79
M1000 .FOR       6 17-May-79      M3000 .FOR       6 17-May-79
M5000 .FOR      21 17-May-79      M6000 .FOR       8 17-May-79
FDM   .MAC      40 17-May-79
 23 Files, 313 Blocks
 167 Free Blocks
```

```
decwriter program:     DISK9.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
NODAL1.OLD      13 23-Jul-79      NODAL .OLD       7 08-May-79
FDM   .OLD      42 09-May-79      NODAL2.OLD      24 09-May-79
NODAL .FOR      11 21-May-79      NODAL1.FOR      15 22-May-79
FDM   .MAC      42 21-May-79      COMP25.COM       1 01-Jul-79
LNK25 .COM       1 01-Jul-79
 9 Files, 156 Blocks
 324 Free Blocks
```

```
decwriter program:      DISK10.DIR      01-Jul-79      12:00:00      Page 001


01-Jul-79
NODAL1.OLD      10 04-Apr-79      NODAL .OLD       6 04-Apr-79
FDM    .OLD     41 23-Jul-79      NODAL2.OLD      25 01-May-79
BWBSA .OLD      13 01-May-79      NODAL .FOR       9 21-May-79
NODAL1.FOR      17 22-May-79      BWBSA .FOR      13 22-May-79
FDM    .MAC     41 21-May-79      COMP26.COM       1 01-Jul-79
LNK26 .COM       1 01-Jul-79
 11 Files, 177 Blocks
 303 Free Blocks
```

```
01-Jul-79
NODAL1.OLD      10 04-Apr-79      NODAL .OLD       6 25-Apr-79
NODAL2.OLD      25 23-Jul-79      FIAC  .OLD      19 06-May-79
FDM   .OLD      41 01-May-79      NODAL .FOR       9 21-May-79
NODAL1.FOR      17 21-May-79      FIAC  .FOR      17 22-May-79
FDM   .MAC      41 21-May-79      COMP27.COM       1 01-Jul-79
LNK27 .COM       1 01-Jul-79
 11 Files, 187 Blocks
 293 Free Blocks
```

```
decwriter program:     DISK12.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
NODAL1.OLD      10 04-Apr-79     FDM    .OLD      41 23-Jul-79
NODAL .OLD       7 23-Jul-79     NODAL2.OLD       26 23-Jul-79
SDCA  .OLD      13 06-May-79     NODAL .FOR        9 21-May-79
NODAL1.FOR      17 21-May-79     SDCA  .FOR       14 21-May-79
FDM   .MAC      41 21-May-79     COMP28.COM        1 01-Jul-79
LNK28 .COM       1 01-Jul-79
 11 Files, 180 Blocks
 300 Free Blocks
```

```
decwriter program:     DISK13,DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
LNK20 .COM       1 07-Mar-79     SIGMAC.OLD       3 12-Apr-79
SIGGEN.OLD      17 01-May-79     SIGGEN.CRT      44 01-May-79
SIGGEN.LDA      36 14-May-79     SIGGEN.FOR      17 21-May-79
SIGMAC.MAC       3 21-May-79     COMP20.COM       1 01-Jul-79
 8 Files, 122 Blocks
 358 Free Blocks
```

```
decwriter program:     DISK15.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
LDRMAC.OLD      17 01-Feb-79      PROM26.MAC      19 01-Feb-79
PROM21.MAC      17 01-Feb-79      PROM22.MAC      17 01-Feb-79
PROM23.MAC      17 01-Feb-79      PROM27.MAC      17 01-Feb-79
PROM28.MAC      17 01-Feb-79      FDMLDR.COM       1 06-Feb-79
PROM25.MAC      18 08-Feb-79      SIGLDR.MAC       7 11-Feb-79
DUMMY .MAC       0 12-Feb-79      FDMLDR.OLD      16 27-Apr-79
FDMLDR.FOR      16 22-Apr-79      LDRMAC.MAC      17 22-May-79
FDMLDR.OBJ      52 27-Apr-79      LDRMAC.OBJ       3 27-Apr-79
FDMLDR.LST      36 01-Jul-79
 17 Files, 287 Blocks
 193 Free Blocks
```

```
decwriter program:     DISK16.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
PRTCT.MAC       15 01-Feb-79     LSICLK.MAC       4 01-Feb-79
CRTPRT.MAC      15 01-Feb-79     LSIMEM.MAC       8 06-Feb-79
LSICPU.MAC      11 06-Feb-79     LIUINT.MAC      10 06-Feb-79
LIUBUF.MAC      12 06-Feb-79     LIURAM.MAC      12 06-Feb-79
DIARCV.MAC      20 17-Mar-79     DIASND.MAC      10 17-Mar-79
EXEML .COM       1 17-Mar-79     LSICPU.OBJ       2 17-Mar-79
LSIMEM.OBJ       1 17-Mar-79     LSICLK.OBJ       1 17-Mar-79
LIUINT.OBJ       2 17-Mar-79     LIUBUF.OBJ       2 17-Mar-79
LIURAM.OBJ       2 17-Mar-79     DIARCV.OBJ       3 17-Mar-79
DIASND.OBJ       2 17-Mar-79     CRTPRT.OBJ       3 17-Mar-79
PRTCRT.OBJ       3 17-Mar-79     LSICPU.SAV       2 17-Mar-79
LSIMEM.SAV       2 17-Mar-79     LSICLK.SAV       2 17-Mar-79
LSICPU.LDA       1 17-Mar-79     LSIMEM.LDA       1 17-Mar-79
LSICLK.LDA       1 17-Mar-79     LIURAM.SAV       3 17-Mar-79
LIUBUF.SAV       4 17-Mar-79     LIUINT.SAV       3 17-Mar-79
CRTPRT.SAV       5 17-Mar-79     PRTCRT.SAV       5 17-Mar-79
DIARCV.SAV       4 17-Mar-79     DIASND.SAV       3 17-Mar-79
DIR   .DIR       3 17-Mar-79
 35 Files, 178 Blocks
 302 Free Blocks
```

```
01-Jul-79
SIEEE .MAC      10 03-Feb-79     RIEFE .MAC      15 03-Feb-79
PGMAC .MAC      17 12-Feb-79     PGLOOP.COM       1 12-Feb-79
PGLOOP.FOR       9 12-Feb-79     WRTLP .FOR       2 12-Feb-79
SIEEE .OBJ       2 26-Apr-79     RIEEE .OBJ       3 26-Apr-79
SIEEE .SAV       3 26-Apr-79     RIEEE .SAV       3 26-Apr-79
PGLOOP.SAV      30               PGLOOP.OBJ      52
WRTLP .OBJ      12               PGMAC .OBJ       3
 14 Files, 162 Blocks
 318 Free Blocks
```

```
decwriter program:     DISK1:.DIR     01-Jul-79     12:00:00     Page 001


01-Jul-79
DXMNFB.SYS      97 18-Oct-78      PIP    .SAV      16 18-Oct-78
DX     .SYS      2 18-Oct-78      SYSLIB.OBJ     203 27-Dec-78
NL     .SYS      2 01-Feb-79      STARTF.COM       1
LINK   .SAV     29 18-Oct-78
 7 Files, 350 Blocks
 130 Free Blocks
```

```
01-Jul-79
NODAL    .OBJ     13 17-May-79    NODAL1.OBJ    57 17-May-79
FDM      .OBJ      5 17-May-79    M0000 .OBJ    46 17-May-79
M1000    .OBJ     17 17-May-79    M2000 .OBJ    16 17-May-79
M3000    .OBJ     14 17-May-79    M4000 .OBJ    55 17-May-79
M5000    .OBJ     56 17-May-79    M6000 .OBJ    21 17-May-79
LNK24    .COM      1 17-May-79    MAP   .MAP    20 17-May-79
DSK18    .DIR      1 01-Jul-79
 13 Files, 340 Blocks
 140 Free blocks
```

4.2.2 DEC System Diskettes

There are nine diskettes which contain programs that support the DEC PDP11V03 as a stand alone unit. Refer to DEC document "Introduction to RT11" for further explanation of each program.

```
decwriter program:     FLP1.DIR       23-Jul-79     13:46:45     Page 001


23-Jul-79
DXMNSJ.SYS      86 14-Aug-77      TT     .SYS       2 14-Aug-77
DP     .SYS      2 14-Aug-77      DT     .SYS       2 14-Aug-77
DX     .SYS      2 14-Aug-77      RF     .SYS       2 14-Aug-77
RK     .SYS      2 14-Aug-77      DM     .SYS       4 14-Aug-77
DS     .SYS      2 14-Aug-77      LP     .SYS       2 14-Aug-77
NL     .SYS      2 14-Aug-77      STARTS.COM        1 11-Jul-77
PIP    .SAV     15 14-Aug-77      DUP    .SAV      17 14-Aug-77
DIR    .SAV     17 14-Aug-77      SYSMAC.SML       37 14-Aug-77
EDIT   .SAV     21 14-Aug-77      MACRO  .SAV       45 14-Aug-77
CREF   .SAV      6 14-Aug-77      LINK   .SAV       29 16-Aug-77
LIBR   .SAV     18 14-Aug-77      FILEX  .SAV       18 14-Aug-77
SRCCOM.SAV      11 14-Aug-77      DUMP   .SAV        7 14-Aug-77
PATCH  .SAV      9 14-Aug-77      HELP   .SAV       21 14-Aug-77
HELP   .TEC      3 23-Jun-77      HELP   .TXT       73 19-Jul-77
DEMOBG.MAC       4 01-Aug-77      DEMOFG.MAC        5 01-Aug-77
V2USER.TXT       2 13-Jul-77      OTS1   .BAK       1
OTS1   .COM      1
 33 Files, 470 Blocks
 10 Free blocks
```

```
decrwiter program:     FLP2.DIR     23-Jul-79     13:47:31     Page 001


23-Jul-79
RKMNSJ.SYS      86 14-Aug-77     RKMNFB.SYS      96 14-Aug-77
RKMNXM.SYS     106 14-Aug-77     RKMNSJ.BL       82 14-Aug-77
DMMNSJ.SYS      87 14-Aug-77     ODT    .OBJ      9 14-Aug-77
 6 Files, 466 Blocks
14 Free blocks
```

```
decwriter program:     FLP3.DIR     23-Jul-79     13:47:49     Page 001


23-Jul-79
DPMNXM.SYS   106 14-Aug-77       RFMNSJ.SYS    86 14-Aug-77
RFMNFB.SYS    96 14-Aug-77       RFMNXM.SYS   106 14-Aug-77
DTX    .SYS    2 14-Aug-77       DPX    .SYS    2 14-Aug-77
DXX    .SYS    3 14-Aug-77       FRX    .SYS    2 14-Aug-77
RKX    .SYS    2 14-Aug-77       DMX    .SYS    4 14-Aug-77
DSX    .SYS    2 14-Aug-77       LPX    .SYS    2 14-Aug-77
CR     .SYS    3 14-Aug-77       CRX    .SYS    3 14-Aug-77
MT     .SYS    8 14-Aug-77       MTX    .SYS    9 14-Aug-77
MTHD   .SYS    3 14-Aug-77       MTHDX  .SYS    4 14-Aug-77
BA     .SYS    7 14-Aug-77       BAX    .SYS    7 14-Aug-77
TT     .MAC    9 14-Aug-77       DEMOED.TXT     1 09-May-77
FLP3   .DIR    2 23-Jul-79
 23 Files, 469 Blocks
 11 Free blocks
```

```
decwriter program:     FLP4.DIR     23-Jul-79     13:48:25     Page 001


23-Jul-79
DMMNFB.SYS      98 14-Aug-77      DMMXXM.SYS     108 14-Aug-77
DXMNFB.SYS      97 14-Aug-77      DXMNXM.SYS     107 14-Aug-77
SYE    .SAV     50 14-Aug-77      NLX    .SYS      2 14-Aug-77
PC     .SYS      2 14-Aug-77      PCX    .SYS      2 14-Aug-77
DEMOF1.FOR       2 28-Jan-77
 9 Files, 468 Blocks
12 Free blocks
```

```
decwriter program:     FLP5.DIR     23-Jul-79     13:48:43     Page 001


23-Jul-79
DXMNSJ.BL       83 14-Aug-77      DTMNSJ.SYS      86 14-Aug-77
DTMNFB.SYS      96 14-Aug-77      DTMNSJ.BL       82 14-Aug-77
DSMNSJ.SYS      86 14-Aug-77      RF     .MAC      6 14-Aug-77
DM     .MAC     19 14-Aug-77      DEMOSP.MAC      11 01-Aug-77
 8 Files, 469 blocks
11 Free blocks
```

```
decwriter program:     FLP6.DIR     23-Jul-79     13:49:01     Page 001


23-Jul-79
DSMNFB.SYS      96 14-Aug-77      DSMNXM.SYS     106 14-Aug-77
OPMNSJ.SYS      86 14-Aug-77      DPMNFB.SYS      97 14-Aug-77
DP     .MAC      9 14-Aug-77      MUBRTE.OBJ       1 04-May-77
MUBTAB.OBJ       1 04-May-77      MUBZN1.OBJ       1 04-May-77
CT     .MAC     32 14-Aug-77      TM     .MAC     24 14-Aug-77
MMHD   .SYS      4 14-Aug-77      MMHDX  .SYS      4 14-Aug-77
PAT    .SAV      7 14-Aug-77
 13 Files, 468 Blocks
 12 Free blocks
```

```
23-Jul-79
KMON   .MAC     118 14-Aug-77      USR    .MAC      59 14-Aug-77
RMONSJ.MAC      56 14-Aug-77      RMONFB.MAC     138 14-Aug-77
EL     .MAC      18 14-Aug-77      LP     .MAC       7 14-Aug-77
RK     .MAC       7 14-Aug-77      DT     .MAC       7 14-Aug-77
DS     .MAC       7 14-Aug-77      PC     .MAC       6 14-Aug-77
ERRUTL.SAV       6 14-Aug-77      MACFST.SAV      45 14-Aug-77
 12 Files, 474 Blocks
 6 Free blocks
```

```
decwriter program:     FLP8.DIR     23-Jul-79     13:49:46     Page 001


23-Jul-79
KMOVLY.MAC    153 14-Aug-77     BSTRAP.MAC     41 14-Aug-77
MTTEMT.MAC     18 16-Aug-77     MTTINT.MAC     34 14-Aug-77
TJ     .MAC    28 14-Aug-77     NL     .MAC     3 14-Aug-77
DX     .MAC    11 14-Aug-77     CR     .MAC    14 14-Aug-77
FSM    .MAC    31 14-Aug-77     BATCH  .MAC    98 14-Aug-77
MUBET1.OBJ      1 04-May-77     MUBXT1.OBJ      1 04-May-77
MUBZ1  .OBJ     1 04-May-77     MUBS1D.OBJ      1 04-May-77
MUBLNK.COM      1 04-May-77     MM     .SYS     9 14-Aug-77
MMX    .SYS     9 14-Aug-77     BA     .MAC    19 14-Aug-77
 18 Files, 473 Blocks
 7 Free Blocks
```

```
decwriter program:     FLP9.DIR     23-Jul-79     13:50:13     Page 001


23-Jul-79
SYSMAC.MAC      36 01-Aug-77      BATCH .SAV      25 14-Aug-77
MACBK .SAV      52 14-Aug-77      PSE   .SAV      13 14-Aug-77
SYSGEN.SAV      32 14-Aug-77      SYSGEN.CND      83 08-Aug-77
SYSTBL.CND      26 08-Aug-77      VTMAC .MAC       7 01-Aug-77
VTHDLR.OBJ       8 14-Aug-77      SYSF4 .OBJ      39 14-Aug-77
MDUP  .SAV       9 14-Aug-77      MDUP  .MM       48 14-Aug-77
MDUP  .MT       48 14-Aug-77      MBOOT .BOT       1 14-Aug-77
MSBOOT.BOT       3 14-Aug-77      STARTF.COM       1 10-Jun-77
STARTX.COM       1 10-Jun-77      SJ    .MAC       1 01-Aug-77
FB    .MAC       1 01-Aug-77      XM    .MAC       1 01-Aug-77
SYSDEV.MAC       1 24-Sep-76      CT    .SYS       5 14-Aug-77
CTX   .SYS       6 14-Aug-77      TECO  .SAV      27 14-Aug-77
DEMOX1.MAC      5 01-Aug-77
 25 Files, 479 Blocks
 1 Free Blocks
```

4.3 System Start-Up

4.3.1 On Loop 5 Utility Panel make sure that individual nodal power swtiches are ON, Run/Halt switches are in the RUN position, and main power breaker is ON.

4.3.2 Turn Loop 5 main power switch ON (on Operator Control Panel).

4.3.3 Press Clear Switch on Operator Control Panel.

4.3.4 Check that all LED's are ON.

4.3.5 Turn PDU main breaker ON (on rear of cabinet).

4.3.6 Turn LA36 DECWriter ON.

4.3.7 Turn VT52 CRT ON.

4.3.8 Insert Diskette #1 in Drive 0 (DXO:) for Loop Loader Utility and Operating System.

4.3.9 Turn PDU DC ON switch to ON, ENABLE/HALT switch to ENABLE, and LTC switch ON, ensure a '$' appears on CRT (VT52) when DC switch is placed to the ON position.

4.3.10 When CRT displays a '$', type DX carriage return and system will boot-strap from DX0:

4.3.11 After boot-strap display, type in current date/time in format:

.DA XX-XXX-XX (Day-Month-Year ex. 1-Nov-79)

.TI XX:XX (Hour:Min ex: 12:01)

4.3.12 Press Clear Switch on operator control panel.

4.3.13 Enter R FDMLDR on VT52 CRT. The loader will then format the screen as in Figure 4-3, automatically perform a report status on each of the nodes, and display their current status on the lower portion of the screen. During any mode of the loader it will update the line on the CRT(VT52) of the node it is currently operating on with status and any detected errors.

Status messages are given below:

NODE 21: ON-LINE READY MODE

Node running loader prom and ready to be loaded.

NODE 21: ON-LINE ERROR DETECTED

Node running loader prom and during initialization of the LIU an error was encountered. (Try pressing CLEAR SWITCH again and selecting mode 4, if it does not come on line, a hard error has developed in that node).

NODE 21: OFF-LINE NO RESPONSE

Node does not respond to a report status command, (insure the node has power, RUN/HALT Switch is in RUN position, and run LED is on; if not, node is unable to communicate via the loop).

Once all nodes are on line and ready the user should select one of the following modes of operation:

4.3.14.1 MODE 1 NORMAL LOAD

By selecting this, the loop is loaded in the normal configuration of software found on the TASK diskette #2 into Drive 1 (DX1) (which must be placed in drive before selection) and loads Nodes 21, 22, 23, 25, 26, 27 and the SIG and with their respective files. The loader will then ask for diskette containing "NODE 28.SAV". The operator should then replace diskette #2 in Drive 1 (DX1) with Diskette #2A and press RETURN. The loader then loads Node 28 and performs a start command on all of the nodes. The loader will then clear the screen and stop, enabling user to start node 24's software. This is done by turning the DC PWR switch on the front of the PDU to the OFF position, removing diskettes from drive 0 (DX0) and drive 1 (DX1), and placing diskette #3 into drive 0 (DX0) and placing diskette #3A into drive 1 (DX1). Turn DC PWR switch to the ON position and ensure a '$' appears on CRT (VT52). Type DX and RETURN on the CRT. The operating system "DXMNSJ.SYS" will now be booted. User should now type:

```
.RESET
.R NODE24
```

Node 24 (PDU) is now loaded and running its normal software configuration which is the MSCDM User Language. The LA36 attached to node 25 will now act as the human interface terminal to the loop network.

4.3.14.2 MODE 2 INDIVIDUAL LOAD

By selecting this, a single node or nodes can be loaded with a file. When selected, the following appears mid-screen on the CRT:

```
NODE [    ]
FILE [              ]
```

Type: xx-Node ## designator, 99-to terminate this mode, 00-SELECT all nodes. This mode loads all nodes in the loop 5 cabinet with the exception of the SIG processor with the specified file, press (RET) and type file name and press (RET), (Note -SIG cannot be loaded under an "00" command because of the file format of that processor (.LDA) so this processor must be selected by itself). This mode responds as in mode #1 except it does not load the normal node's file and does not auto-start the processors.

4.3.14.3 MODE 3 START NODE(S)

By selecting this mode, the user may start a single node or (re) start all nodes on the loop, by sending a command message to the node requesting that they start their application software.

The loader displays mid-screen on the CRT.

START NODE [ ]

TYPE: xx-Node # Designator, 99-to terminate, 00-SELECT all nodes, press (RET). (Note: SIG is autostarted after load only and will not respond to this command).

4.3.14.4 MODE 4 REPORT STATUS

By selecting this, the loader sends a command message to all nodes requesting that they report their current status back, the loader then displays that status on the lower portion of the screen. (Refer to 4.3.13 for the meaning of the status reports that appear on the bottom of CRT (VT52) screen).

4.3.14.5 MODE 5 TERMINATE

By selecting this, the user wishes to stop the loader, the loader clears the CRT screen and turns control back to the operating system.

```
MSCDM (LOOP 5) LOADER / RUNNING ON NODE 24:

SELECTION ?

     1.  NORMAL LOAD
     2.  INDIVIDUAL LOAD
     3.  START NODE(S)
     4.  REPORT STATUS
     5.  TERMINATE


NODE 21:  ON-LINE READY MODE
NODE 22:  OFF-LINE NO RESPONSE
NODE 23:  ON-LINE ERROR DETECTED
NODE 25:  "
NODE 26:  "
NODE 27:  "
NODE 28:  "
NODE 20:  "
```

Figure 4-3
CRT Screen Format

4.4 USER LANGUAGE

The following Host-Console dialogue is given as an example of the FDM User Language. Responses are typed on the operator console. The dialogue may be restarted at any time by entering DS at the console. Messages to be sent on the loop are terminated with a Carriage Return. For multiple line messages, a CTRL C character is used at the end of each line; a CTRL U character is used to erase the current line typed in.

Mode 1 (CRT-to-CRT) will allow a message to be sent from the Node 25 Console to another CRT. Mode 2 (System Inquiry) will give all the ESM system information. Mode 3 (Module Update) will allow the operator to turn the event reporting on or off, and request a measurement on any equipment in the system. Mode 4 (File Access) will allow the operator to access records of files by entering a 4 or 6 character key. Mode 5 (Report) will give the operator a menu selection of commands that will generate a report on the failure and repair of the equipment. Mode 6 (Status) will give the current status of all the equipment. The following is the dialogue for the User Language.

- USER LANGUAGE START-UP DIALOGUE -

```
THIS IS THE FDM - (FEASIBILITY DEVELOPMENT MODEL)
     ENTER USERCODE PLEASE
DAN

     ENTER PASSWORD PLEASE
ESM

     YOU ARE NOW LOGGED IN - (TO LOGOUT, ENTER 'DS')
 PLEASE SELECT ONE MODE OF OPERATION:
     1. CRT TO CRT
     2. SYSTEM INQUIRY
     3. MODULE UPDATE
     4. FILE ACCESS
     5. REPORT
     6. STATUS
```

```
 ENTER DEST CRT NODE DESIGNATOR (ND) - 04 FOR LP#2, 08 FOR LP#3
      18 FOR LP#4, 25 FOR FDM.

25

      PLEASE TYPE IN MESSAGE AND PRESS RETURN

THIS MESSAGE IS GOING TO BE SENT TO THIS CRT.
THIS MESSAGE IS GOING TO BE SENT TO THIS CRT.
      MSG SENT TO CRT ND=25
 PLEASE SELECT ONE MODE OF OPERATION:
      1. NEW MESSAGE TO SAME CRT
      2. NEW MESSAGE TO ANOTHER CRT
      3. LOGOUT
      4. NEW MODE OF OPERATION
2
 ENTER DEST CRT NODE DESIGNATOR (ND) - 04 FOR LP#2, 08 FOR LP#3
      18 FOR LP#4, 25 FOR FDM.
18
      PLEASE TYPE IN MESSAGE AND PRESS RETURN
THIS MESSAGE TO LOOP 4 IS NOT GOING TO BE SENT. **
      MSG SENT TO CRT ND=18
 PLEASE SELECT ONE MODE OF OPERATION:
      1. NEW MESSAGE TO SAME CRT
      2. NEW MESSAGE TO ANOTHER CRT
      3. LOGOUT
      4. NEW MODE OF OPERATION


MESSAGE NOT RECEIVED FROM NODE  24 TO NODE  18 **

3
 YOU ARE LOGGED OUT FROM FDM
```

** PLEASE NOTE Loop 4 was not powered up.

```
PLEASE SELECT TYPE OF SYSTEM INFORMATION:
     1. NETWORK DEVICE INFORMATION
     2. LID/FAD CONVERSION TABLE (LID'S 1-100)
     3. LID/FAD CONVERSION TABLE (LID'S 101-254)
     4. WORKPAGE PARAMETERS OF NODES

1

                    NETWORK DEVICE INFORMATION

     NT    ND RDA  LP      NT    ND RDA  LP      NT    ND RDA  LP
    HSTA    1   1   1   GAT3-1  11   1   3    SSCI  21   1   5
  GAT1-2    2   2   1   GAT4-3  12   3   4    VSAC  22   3   5
  GAT1-3    3   3   1   GAT4-5  13   5   4    DSAC  23   6   5
    CRT4    4   4   2   AUTODN  14   1   4    HSTD  24   5   5
    HSTB    5   2   2     ICCF  15   2   4   CRT25  25   7   5
  GAT2-1    6   1   2     HSTC  16   4   4   BWBSA  26   8   5
  GAT2-3    7   3   2     SDLC  17   6   4    FIAC  27   9   5
    CRT8    8   3   3    CRT18  18   7   4    SDCA  28   2   5
  GAT3-4    9   4   3    SECUR  19   8   4
  GAT3-2   10   2   3
        NOTE: ND=NODE DESIGNATOR, RDA=READ ADDRESS, LP=LOOP
        --PRESS RETURN FOR NEXT INSTRUCTION--


PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW SYSTEM INQUIRY
     2. LOGOUT
     3. ANOTHER MODE OF OPERATION

1
PLEASE SELECT TYPE OF SYSTEM INFORMATION:
     1. NETWORK DEVICE INFORMATION
     2. LID/FAD CONVERSION TABLE (LID'S 1-100)
     3. LID/FAD CONVERSION TABLE (LID'S 101-254)
     4. WORKPAGE PARAMETERS OF NODES
```

2

PLEASE ENTER NODE DESIGNATOR (ND)
IF ND IS NOT KNOWN, ENTER NDI FOR NETWORK DEVICE INFORMATION

NDI

NETWORK DEVICE INFORMATION

NT	ND	RDA	LP	NT	ND	RDA	LP	NT	ND	RDA	LP
HSTA	1	1	1	GAT3-1	11	1	3	SSCT	21	1	5
GAT1-2	2	2	1	GAT4-3	12	3	4	VSWF	22	3	5
GAT1-3	3	3	1	GAT4-5	13	5	4	DSWL	23	6	5
CRT4	4	4	2	AUTODIN	14	1	4	HSTD	24	5	5
HSTB	5	2	2	IECF	15	2	4	CRT25	25	7	5
GAT2-1	6	1	2	HSTC	16	4	4	RWRSA	26	8	5
GAT2-3	7	3	2	SDLC	17	6	4	FIAC	27	9	5
CRTB	8	3	3	CRT10	18	7	4	SNCA	28	2	5
GAT3-4	9	4	3	SECUR	19	8	4				
GAT3-2	10	2	3								

NOTE: ND=NODE DESIGNATOR, RDA=READ ADDRESS, LP=LOOP
--PRESS RETURN FOR NEXT INSTRUCTION--

PLEASE ENTER NODE DESIGNATOR (ND)
IF ND IS NOT KNOWN, ENTER NDI FOR NETWORK DEVICE INFORMATION
25

LOOP -5- LID/RAD CONVERSION TABLE, FOR LIDS 1-100

4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	3	6	5	7	8	9	2												
0																			
0																			
0																			

-PRESS RETURN FOR NEXT INSTRUCTION-

PLEASE SELECT ONE OF THE FOLLOWING:
1. NEW SYSTEM INQUIRY
2. LOGOUT
3. ANOTHER MODE OF OPERATION
1

PLEASE SELECT TYPE OF SYSTEM INFORMATION:
1. NETWORK DEVICE INFORMATION
2. LID/RAD CONVERSION TABLE (LIDS 1-100)
3. LID/RAD CONVERSION TABLE (LIDS 101-254)
4. WORKLOAD PARAMETERS OF NODES

- MODE 2 cont. -

```
3


     PLEASE ENTER NODE DESIGNATOR (ND)
     IF ND IS NOT KNOWN, ENTER ND1 FOR NETWORK DEVICE INFORMATION
25

       LOOP -5- LID/FAD CONVERSION TABLE, FOR LIDS 101-255
0
0
0
0
0
0
0
0
       -PRESS RETURN FOR NEXT INSTRUCTION-

 PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW SYSTEM INQUIRY
     2. LOGOUT
     3. ANOTHER MODE OF OPERATION

1

 PLEASE SELECT TYPE OF SYSTEM INFORMATION:
     1. NETWORK DEVICE INFORMATION
     2. LID/FAD CONVERSION TABLE (LID'S 1-100)
     3. LID/FAD CONVERSION TABLE (LID'S 101-254)
     4. WORKPAGE PARAMETERS OF NODES

4

     PLEASE ENTER NODE DESIGNATOR (ND)
     IF ND IS NOT KNOWN, ENTER ND1 FOR NETWORK DEVICE INFORMATION

25

                  NODE WORKPAGE PARAMETERS
   CRT25  NODE HAS DESIGNATOR      25      IN  LOOP#          5
   ALTERNATE GATEWAY FUNCTIONAL ADDRESS  .............       NA
   MAXIMUM INPUT QUEUE SIZE (TO EXTERNAL) ............       64
   MAXIMUM OUTPUT QUEUE SIZE (TO BITSTREAM) ..........        2
   MAXIMUN PACKET XMISSIONS BEFORE MSG TERM ..........        4
   TIMEOUT FOR WRITE TOKEN REGENERATION ..............       15
   TIMEOUT FOR PACKET RETRANSMISSION .................       25
   NUMBER OF NODES IN LOCAL LOOP .....................        8
  PRESS RETURN FOR NEXT INSTRUCTION

 PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW SYSTEM INQUIRY
     2. LOGOUT
     3. ANOTHER MODE OF OPERATION
```

```
 PLEASE SELECT COLUMN FUNCTION TO BE UPDATED
     1. VSUC'    3. RWRSA
     2. DSUC     4. SDCA
1
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
1
  PLEASE ENTER NODE DESIGNATOR FOR EVENT REPORTS
     (E.G., 04,08,18,25)
25
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
2
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
3
  PLEASE ENTER CHANNEL,LINK OR SWITCH NUMBER TO BE MEASURED (FORMAT I4)
0001
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT

   1      0.787444     13.289394    -66.864304     17.916870    -56.522200     13.563904
```

```
1
 PLEASE SELECT COLUMN FUNCTION TO BE UPDATED
     1. VSWR      3. SWRSA
     2. RSWR      4. SRCA
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
1
  PLEASE ENTER NODE DESIGNATOR FOR EVENT REPORTS
     (E.G., 04,08-18,25)
25
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
2
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
3
  PLEASE ENTER CHANNEL,LINK OR SWITCH NUMBER TO BE MEASURED (FORMAT I4)
0501
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
 501 0.78744    13.678274    19.487560
```

-MODE 3 cont. -

```
1
 PLEASE SELECT COLUMN FUNCTION TO BE UPDATED
      1. VSWR      3. RWPSA
      2. DSWR      4. SWCA
3
  PLEASE SELECT TYPE OF UPDATE
      1. EVENT REPORTING ON
      2. EVENT REPORTING OFF
      3. MEASURMENT REQUESTED
1
  PLEASE ENTER NODE DESIGNATOR FOR EVENT REPORTS
      (E.G., 04,08,18,25)
25
  PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW COLUMN FUNCTION
      2. SAME COLUMN FUNCTION
      3. NEW MODE OF OPERATION
      4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
      1. EVENT REPORTING ON
      2. EVENT REPORTING OFF
      3. MEASURMENT REQUESTED
2
  PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW COLUMN FUNCTION
      2. SAME COLUMN FUNCTION
      3. NEW MODE OF OPERATION
      4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
      1. EVENT REPORTING ON
      2. EVENT REPORTING OFF
      3. MEASURMENT REQUESTED
3
  PLEASE ENTER CHANNEL,LINK OR SWITCH NUMBER TO BE MEASURED (FORMAT I4)
0001
  PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW COLUMN FUNCTION
      2. SAME COLUMN FUNCTION
      3. NEW MODE OF OPERATION
      4. LOGOUT
 1   32.874147    56.875463   45.873629    23.450121    34.987236    19.231048
     89.491025    32.866140   02.456792    10.294710    98.670853    78.788650
     90.710030
```

- MODE 3 cont. -

```
1
 PLEASE SELECT COLUMN FUNCTION TO BE UPDATED
     1. VSOC      3. RWBSA
     2. DSOC      4. SDLA
4
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
1
  PLEASE ENTER MODE DESIGNATOR FOR EVENT REPORTS
     (E.G., 04,08,16,25)
25
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
2
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT
2
  PLEASE SELECT TYPE OF UPDATE
     1. EVENT REPORTING ON
     2. EVENT REPORTING OFF
     3. MEASURMENT REQUESTED
3
  PLEASE ENTER CHANNEL,LINK OR SWITCH NUMBER TO BE MEASURED (FORMAT I4)
0001
  PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW COLUMN FUNCTION
     2. SAME COLUMN FUNCTION
     3. NEW MODE OF OPERATION
     4. LOGOUT

  1 695    8  40   8 102 102    8    1    8   20   32    4   51   51    4
```

ation which is the MSCDM User Language. The LA36 attached to node 25 will now act as the human interface terminal to the loop network.

57

- MODE 4 (FILE ACCESS) -

```
 PLEASE SELECT FILE TO BE ACCESSED:
      1. CIRCUIT FILE
      2. TRUNK FILE
1
      THE KEY IS 4 BYTES
 DO YOU WISH TO MODIFY THIS RECORD
      1. YES
      2. NO
1
 PLEASE ENTER KEY OF RECORD TO BE MODIFIED
AAAA
AAA1   CKT  BAD  LANGERKIFF  DONNERSBERG N  5629   0828  5/29  1979
 FOR THIS RECORD, PLEASE SELECT TYPE OF DESIRED CHANGE
      1. UPDATE
      2. DELETE
1
 MAKE ANY CHANGED YOU WISH USING CRT
 WHEN CHANGES ARE COMPLETE, PRESS RETURN
RECORDAAAA CHANGED.
 ** MODIFICATION COMPLETE **
RECORDAAAA CHANGED.
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW RECORD OF FILE
      2. NEW FILE
      3. ANOTHER MODE OF OPERATION
      4. LOGOUT
      5. SAME RECORD
1
 DO YOU WISH TO MODIFY THIS RECORD
      1. YES
      2. NO
1
 PLEASE ENTER KEY OF RECORD TO BE MODIFIED
DDMS
 THE RECORD DOES NOT EXIST
 DO YOU WISH TO ADD A NEW RECORD TO THE FILE?
      1. YES
      2. NO
1
 TYPE IN NEW RECORD
THIS IS A NEW RECORD.
 ** MODIFICATION COMPLETE **
THIS IS A NEW RECORD.
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW RECORD OF FILE
      2. NEW FILE
      3. ANOTHER MODE OF OPERATION
      4. LOGOUT
      5. SAME RECORD
5
 DO YOU WISH TO MODIFY THIS RECORD
      1. YES
      2. NO
2
THIS IS A NEW RECORD.
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW RECORD OF FILE
      2. NEW FILE
      3. ANOTHER MODE OF OPERATION
      4. LOGOUT
      5. SAME RECORD
```

and will not respond to this command).

- MODE 4 cont. -

```
2
 PLEASE SELECT FILE TO BE ACCESSED:
      1. CIRCUIT FILE
      2. TRUNK FILE
2
      THE KEY IS 6 BYTES
 DO YOU WISH TO MODIFY THIS RECORD
      1. YES
      2. NO
2
 PLEASE ENTER ACCESS KEY
AAAAAA
 THE RECORD DOES NOT EXIST.  PRESS RETURN KEY

 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW RECORD OF FILE
      2. NEW FILE
      3. ANOTHER MODE OF OPERATION
      4. LOGOUT
      5. SAME RECORD
5
 DO YOU WISH TO MODIFY THIS RECORD
      1. YES
      2. NO
1
 THE RECORD DOES NOT EXIST
 DO YOU WISH TO ADD A NEW RECORD TO THE FILE?
      1. YES
      2. NO
1
 TYPE IN NEW RECORD
THIS IA A ^U
THIS IS A NEW RECORD......
 ** MODIFICATION COMPLETE **
THIS IS A NEW RECORD......
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW RECORD OF FILE
      2. NEW FILE
      3. ANOTHER MODE OF OPERATION
      4. LOGOUT
      5. SAME RECORD
```

- MODE 5 (REPORT MODE) -

```
5
 DO YOU HAVE A FILE ALREADY OPEN?
      1. YES
      2. NO
2
 PLEASE SELECT TYPE OF REPORT TO BE GENERATED:
      1. CHANNEL-LINK
      2. SWITCH
1
 IF YOU DO NOT HAVE AN ANSWER FOR A QUESTION
 ENTER THREE(3) '???'
 IF THE QUESTION IS NONAPPLICABLE ENTER 'N/A'
 PRESS RETURN KEY WHEN READY

 ENTER REPORTING STATION INDICATOR (3 CHARACTERS)
ESM
 ENTER REPORT SEQUENCE NUMBER (2 DIGITS)
01
 ENTER DATE-TIME THE REPORT IS MADE (DDTTTT)
231030
 ENTER LINK IDENTIFIER (5 CHARACTERS)
00001
 ENTER CHANNEL NUMBER (3 DIGITS)
233
 ENTER TIME THE OUTAGE  BEGAN (TTTT)
0930
 ENTER TIME THE OUTAGE TERMINATED (TTTT)
1130
 ENTER REASON FOR OUTAGE CODE (3 CHARACTERS)
ABC
 ENTER REMARKS -
    MAXIMUM OF THREE LINES
    USED 'XXXX' TO INDICATE END OF REMARKS:
THIS IS THE REMARKS SECTION.
XXXX
 IS REPORT COMPLETE
      1. YES
      2. NO
1
  ENTER DESTINATION NODE DESIGNATOR
 (04 FOR LP #1, 08 FOR LP #2, 18 FOR LP #4, 25 FOR FDM)
25
 REPORTING STATION INDICATOR ESM
 REPORT SEQUENCE NUMBER 01
 DATE-TIME REPORT IS MADE 231030
 LINK IDENTIFIER 00001
 CHANNEL NUMBER 233
 TIME THE OUTAGE BEGAN 0930
 TIME THE OUTAGE TERMINATED 1130
 REASON FOR OUTAGE CODE ABC
THIS IS THE REMARKS SECTION.
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW REPORT
      2. NEW MODE OF OPERATION
      3. LOGOUT

1
```

- MODE 5 cont. -

```
DO YOU HAVE A FILE ALREADY OPEN?
     1. YES
     2. NO
2
PLEASE SELECT TYPE OF REPORT TO BE GENERATED:
     1. CHANNEL-LINK
     2. SWITCH
2
IF YOU DO NOT HAVE AN ANSWER FOR A QUESTION
ENTER THREE(3) '???'
IF THE QUESTION IS NONAPPLICABLE ENTER 'N/A'
PRESS RETURN KEY WHEN READY

ENTER REPORTING STATION INDICATOR (3 CHARACTERS)
ESM
ENTER REPORT SEQUENCE NUMBER (2 DIGITS)
02
ENTER DATE-TIME THE REPORT IS MADE (DDTTTT)
231100
ENTER SWITCH IDENTIFIER (5 CHARACTERS)
00002
ENTER TIME THE OUTAGE  BEGAN (TTTT)
0930
ENTER TIME THE OUTAGE TERMINATED (TTTT)
1100
ENTER REASON FOR OUTAGE CODE (3 CHARACTERS)
ABC
ENTER REMARKS -
   MAXIMUM OF THREE LINES
   USED 'XXXX' TO INDICATE END OF REMARKS:
THIS IS THE REMARKS SECTION.
XXXX
IS REPORT COMPLETE
     1. YES
     2. NO
1
 ENTER DESTINATION NODE DESIGNATOR
(04 FOR LP #1, 08 FOR LP #2, 18 FOR LP #4, 25 FOR FDM)
25
REPORTING STATION INDICATOR ESM
REPORT SEQUENCE NUMBER 02
DATE-TIME REPORT IS MADE 231100
SWITCH IDENTIFIER 00002
CHANNEL NUMBER 0930
TIME THE OUTAGE BEGAN 1100
TIME THE OUTAGE TERMINATED ABC
THIS IS THE REMARKS SECTION.
PLEASE SELECT ONE OF THE FOLLOWING:
     1. NEW REPORT
     2. NEW MODE OF OPERATION
     3. LOGOUT
```

```
 PLEASE ENTER ONE OF THE FOLLOWING:
      1. DISPLAY RED STATUS
      2. DISPLAY AMBER STATUS
      3. DISPLAY SELECTED EQUIPMENT
      4. MANUALLY CHANGE STATUS OF SELECTED EQUIPMENT
1
STATUS        111111 1001 1
STATUS        111112 1002 1
STATUS        111113 1003 1
STATUS      1     2    24    1
STATUS      2     9     9    1
STATUS      PRESS RETURN  1

 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW CHANNEL,LINK, OR SWITCH
      2. NEW MODE OF OPERATION
      3. SAME MODE OF OPERATION
      4. LOGOUT
3
 PLEASE ENTER ONE OF THE FOLLOWING:
      1. DISPLAY RED STATUS
      2. DISPLAY AMBER STATUS
      3. DISPLAY SELECTED EQUIPMENT
      4. MANUALLY CHANGE STATUS OF SELECTED EQUIPMENT
2
STATUS      AAAA0009 0009 2
STATUS      AAAA0026 0026 2
STATUS      AAAA0053 0053 2
STATUS      AAAA0106 0106 2
STATUS      AAAA0159 0159 2
STATUS      AAAA0161 0161 2
STATUS      AAAA0163 0163 2
STATUS      AAAA0172 0172 2
STATUS      AAAA0197 0197 2
STATUS      AAAA0233 0233 2
STATUS      AAAA0256 0256 2
STATUS      AAAA0277 0277 2
STATUS      AAAA0324 0324 2
STATUS      AAAA0339 0339 2
STATUS      AAAA0396 0396 2
STATUS      AAAA0402 0402 2
STATUS      AAAA0423 0423 2
STATUS      AAAA0427 0427 2
STATUS      AAAA0428 0428 2
STATUS      AAAA0465 0465 2
STATUS      AAAA0473 0473 2
STATUS      AAAA0474 0474 2
STATUS      AAAA0482 0482 2
STATUS      AAAA0488 0488 2
STATUS      AAAA0493 0493 2
STATUS      BBBB0738 0738 2
STATUS      BBBB0811 0811 2
STATUS      BBBB0845 0845 2
STATUS      BBBB0875 0875 2
STATUS      BBBB0894 0894 2
STATUS      BBBB0926 0926 2
STATUS      BBBB0944 0944 2
STATUS      PRESS RETURN  2
```

```
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW CHANNEL,LINK, OR SWITCH
      2. NEW MODE OF OPERATION
      3. SAME MODE OF OPERATION
      4. LOGOUT
3
 PLEASE ENTER ONE OF THE FOLLOWING:
      1. DISPLAY RED STATUS
      2. DISPLAY AMBER STATUS
      3. DISPLAY SELECTED EQUIPMENT
      4. MANUALLY CHANGE STATUS OF SELECTED EQUIPMENT
3
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. CHANNEL 1-1000      4. MULTIPLEXOR 1-3
      2. LINK    1-3         5. TRANSMITTER 1-3
      3. SWITCH  1 OR 2      6. RECEIVER    1-3
2
 PLEASE ENTER DEVICE NUMBER TO BE DISPLAYED (FORMAT I4)
0001
  111111 1001 1
 PRESS RETURN FOR NEXT INSTRUCTION

 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW CHANNEL,LINK, OR SWITCH
      2. NEW MODE OF OPERATION
      3. SAME MODE OF OPERATION
      4. LOGOUT
3
 PLEASE ENTER ONE OF THE FOLLOWING:
      1. DISPLAY RED STATUS
      2. DISPLAY AMBER STATUS
      3. DISPLAY SELECTED EQUIPMENT
      4. MANUALLY CHANGE STATUS OF SELECTED EQUIPMENT
4
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. CHANNEL 1-1000      4. MULTIPLEXOR 1-3
      2. LINK    1-3         5. TRANSMITTER 1-3
      3. SWITCH  1 OR 2      6. RECEIVER    1-3
2
 PLEASE ENTER DEVICE NUMBER TO BE CHANGED
 FOLLOWED BY NEW VALUE (FORMAT I4,I1)
0001,2
 MODIFICATION COMPLETE
 PLEASE SELECT ONE OF THE FOLLOWING:
      1. NEW CHANNEL,LINK, OR SWITCH
      2. NEW MODE OF OPERATION
      3. SAME MODE OF OPERATION
      4. LOGOUT
```

- MODE 6 cont. -

- LOGOUT MESSAGE -

```
DS
YOU ARE LOGGED OUT FROM FDM
```

4.5 MAINTENANCE AND DIAGNOSTICS

The MSCDM maintenance philosophy is similar to that of ESMD; i.e., run diagnostic programs in order to isolate the bad card and then replace the bad card with a spare. The following paragraphs identify the various diagnostic programs and their application for use in MSCDM.

4.5.1 LSI-11 MEMORY TEST

Source File: LSIMEM.MAC

Task File: LSIMEM.SAV

PURPOSE: To test LSI-11 Mos Memory board

DESCRIPTION: This program writes and reads various patterns into the LSI-11 memory starting at the last address of the program, to address 160000_8. The patterns used are all zeros, all ones, alternating ones and zeros and random numbers. If the data read from a memory location doesn't match the data written to it, the program halts displaying the current program address which is used to determine which test failed and location MSTART contains the bad memory address.

4.5.2 LSI-11 CPU TEST

Source File: LSICPU.MAC

Task File: LSICPU.SAV

PURPOSE: To test LSI-11/2 CPU

DESCRIPTION: This program tests all LSI-11/2 single, double, and jump instruction sets. The program loops until an error is detected in the CPU; when detected, the current program address is displayed showing what instruction set is causing the error.

4.5.3 LSI-11 REAL TIME CLOCK TEST

Source File: LSICLK.MAC

Task File: LSICLK.SAV

PURPOSE: To test LSI-11 RTC

DESCRIPTION: This program waits for interrupts from the real time clock and increments a counter when one is received. When the program does not detect an interrupt in a given time it halts, detecting an error, and displays current program address.

4.5.4 LIU BUFFER TEST

Source File: LIUBUF.MAC

Task File : LIUBUF.SAV

PURPOSE: To test the input and output buffers in the LIU.

DESCRIPTION: This program initializes the buffers and then writes and reads various patterns from the LIU buffers. The patterns used are all ones, all zeros, alternating ones and zeros and random numbers. If the data read from the LIU buffer does not match the data written to it, the program stores an indicator of which buffer is in error and halts, displaying the current program address. Otherwise, the program loops, repeating the test indefinitely.

4.5.5 LIU ADDRESS COMPARISON RAM TEST

Source File: LIURAM.MAC

Task File : LIURAM.SAV

PURPOSE: To test the address comparison RAM of the LIU

DESCRIPTION: This program writes and reads various patterns to the address comparison RAM. The patterns used are all zeros, all ones, alternating ones and zeros and random numbers. If the data read from a memory location doesn't match the data written to it, the program halts displaying current program address. Otherwise, the program loops, repeating the tests indefinitely.

4.5.6 BLIUI INTERFACE TEST

Source File: LIUINT.MAC

Task File : LIUINT.SAV

PURPOSE: To test the LSI-11/LIU interface

DESCRIPTION: This program tests the interface registers with patterns of all zeros and ones and continues by selecting INPUT BUFFER 0, where it performs a DMA write of a pattern of alternating zeros and ones and then performs a DMA READ, testing the data read back. Should the data written not compare to the data read, the program halts, displaying the current program address.

4.5.7 MSCDM DIAGNOSTIC OPERATING INSTRUCTIONS

4.5.7.1 RUNNING DIAGNOSTICS ON PDU NODE

1. Insert diskette #1 into DX0:
2. Insert diagnostic diskette #16 into DX1:
3. Type .GET fid where fid=file name
4. Press BREAK KEY
5. Insure that the RTC is off
6. TYPE @1000G
7. Diagnostic will then loop until an error is detected whereby the current program address (PC) +2 will be displayed on the CRT. By looking at the source code for that diagnostic the address (PC) will indicate the error that was detected, and the user registers will hold the cause of the error.

4.5.7.2 RUNNING DIAGNOSTICS ON A LOOP NODE

1. Insert diskette #1 into DX0:
2. Insert diagnostic diskette #16 into DX1:
3. Turn the RTC off on node(s) under test
4. Run FDMLDR to load and start the diagnostic
5. Insure the RUN LED on the front panel for that node stays on (diagnostic running). Should the LED extinguish an error was detected and the software has halted.
6. By attaching a CRT MAINTENANCE CABLE to the node and restarting program at address 1000 (@ 1000G) using the CRTthe diagnostic will again begin to run and when the error develops again the (PC) will be displayed on the CRT. By looking at the source code for that diagnostic the address (PC) will indicate the error that was detected, and the user registers hold the cause of the error.

Note: Not all nodes contain a DLVII interface card that can support the CRT. Cards may have to be swapped with another node.

4.5.7.3 RUNNING DIAGNOSTICS ON SIG

SIG takes a special type of software which is in the .LDA format and when loaded it STARTS automatically. Also note that the SIG loads via the asynchronous interface from node 26. The procedure other than that is the same for any other node on loop.

4.5.8 SEQUENCE OF DIAGNOSTICS

By running diagnostics in a certain sequence, the hardware error can be isolated down to a specific card. The recommended sequence is given below:

1. RUN LSICPU - CPU diagnostic
2. RUN LSIMEM - MEMORY diagnostic
3. RUN LIUINT - INTERFACE diagnostic
4. RUN LIURAM - ACRAM diagnostic
5. RUN LIUBUF - BUFFER diagnostic

5. PAGE PROGRAM DESCRIPTION

PGLOOP is a program that allows a user of MSCDM to get a hard copy print out of a source file stored on the PDP11/03's diskettes. Using Node 25's LA36 printer this program is made up of three source files: PGLOOP, WRTLP and PGMAC. This allows the LA36 to act as a line printer by providing for FF, tab and sequence numbers. (NOTE: All equipment in Loop 5 must be powered up.)

5.1 Using Page

1. Press Clear Switch on Loop cabinet
2. Diskette #1 must be in Drive 0 and RT-11 OS booted.
3. Insert USER's diskette into Drive 1
4. Type .R PGLOOP
5. The CRT screen will then be formatted as follows

```
FILE [            ]
SEQN [      ]
```

6. Cursor is placed just right bracket of file line
7. Type your file to copied, i.e., "123456.123"
8. Press RETURN
9. Type "Y or N" for sequence numbers
10. Place LA36 printer head just below fan fold of paper
11. Press RETURN

12. File will then begin to print; when complete the utility will return to step 5, enabling a new file to be typed in.
13. To stop PGLOOP type "END" when it asks for a file name.

NOTE: on files with types of ".LST, .MAP" PGLOOP will not ask for sequence numbers

NOTE: after the first file is printed, step 11 need not be done

6. USING THE PDU PROGRAM DEVELOPMENT SYSTEM FOR SOFTWARE GENERATION

Start-Up Procedures

1. Turn on main breaker at rear of PDU cabinet.
2. Turn on CRT switch on (right side of CRT).
3. Insert an operating diskette #1 into drive (0) (left).
4. Turn on all (three) switches on front of PDU.
5. A "$" should appear on CRT, type "DX" (return).
6. System should then "Boot strap displaying startup commands".
7. Type in date (.DA dd-mon-yy).
8. Type in time (.TI hh:mm:ss).
9. System is now ready to be used as a program development system.
10. Diskette #1 contains the EDITOR, FORTRAN, MACRO system files; this disk will be used to do all system functions except linking of FORTRAN object files.
11. Diskette #4 is used as a linking disk. It is inserted into Drive 0 and invoked by a user command file to link FORTRAN object files.

7. Acceptance Test Plan for MSCDM

7.1 Purpose

This Acceptance Test Plan is designed to demonstrate all implemented features and functions of the MSCDM Feasibility Development Model (FDM). The requirements for the MSCDM are defined in the SOW and the MSCDM Proposal (B-4645-A) Volume 2 dated May 21, 1976. Use and operation of the FDM is defined in the User Manual for the MSCDM. The FDM will be interfaced to the ESM Multiloop Network and will add a fifth loop to the current four loop configuration. Use and operation of the ESM is defined in the User Manual for the ESMD, dated March 1978 and the User Manual for the ESM, dated March 1977.

7.2 References

User Manual for ESM (66143-1), March 1977
User Manual for ESMD (66146), March 1978
User Manual for MSCDM, December 1978
Statement of Work for MSCDM
MSCDM Proposal (B-4645-A) Volume 2, May 1976
[Statement of Work]

7.3 Method of Demonstration/Testing

All implemented functions/features of the MSCDM FDM will be demonstrated/tested in accordance with the procedures defined in Section 7.4 below.

Specific features/functions of the MSCDM FDM which are demonstrated by the procedures of Section 7.4 include:

7.3.1.	System Start-Up and Loading
7.3.2	MSCDM User Language Capabilities
7.3.2.1	Mode 1 - CRT-to-CRT
7.3.2.2	Mode 2 - System Inquiry
7.3.2.3	Mode 3 - Module Update
7.3.2.4	Mode 4 - File Access
7.3.2.5	Mode 5 - Report
7.3.2.6	Mode 6 - Status
7.3.3	Terminal ATTACH Capability
7.3.4	Fail Soft Operation
7.3.5	Demonstration of Individual Modules
7.3.5.1	SSCI
7.3.5.2	VSQC
7.3.5.3	DSQC
7.3.5.4	DBMS
7.3.5.5	OCRI
7.3.5.6	BWBSA
7.3.5.7	FIAC
7.3.5.8	SDCA
7.3.5.9	SIG

7.3.6 PDP11V03 Used as a PDU
7.3.7 Diagnostics
7.3.8 Variable Clock Rate
7.3.9 48 Hour Continuous Operation Test

7.4 Demonstration/Test Procedures

The following procedures define the specific actions to be taken in demonstrating/testing the MSCDM.

7.4.1 System Start-up and Loading

7.4.1.1 Power Up the PDP11V03 Program Development Unit (PDU), Loop 5, VT52 Local CRT terminal, and LA36 loop-connected printer terminal.

7.4.1.2 Load Loop 5 microprocessors from the PDU

7.4.2 MSCDM User Language

Run User Language (USRLNG) on PDU from the VT52 Local CRT terminal. Demonstrate all features of the following modes of operation:

7.4.2.1	Mode 1 - CRT-to-CRT	
7.4.2.2	Mode 2 - System Inquiry	[2.1.i]
7.4.2.3	Mode 3 - Module Update will be demonstrated in 5.4.5 below	[See 7.4.5 below]
7.4.2.4	Mode 4 - File Access	[2.1.i, 2.1.j]
7.4.2.5	Mode 5 - Report	[2.1.i]
7.4.2.6	Mode 6 - Status	[2.1.i, 2.1.j]

7.4.3 Terminal ATTACH Capability [2.1.g]

Demonstrate that the OCRI LA36 terminal (node 25) can ATTACH to the B776 Host processor in loop 4 (node 16). ATTACH back to the DBMS (node 24).

7.4.4 Fail Soft Operation

Demonstrate OCRI-DBMS Communication. Simulate a node failure by removing an LIU card (other than nodes 24 and 25). Demonstrate fault reporting. Demonstrate OCRI-DBMS communication.

7.4.5 Demonstration of Individual Modules

7.4.5.1 SSCI - The SSCI is used for loop 4 - loop 5 communication. It was demonstrated by 7.4.2.1 and 7.4.3 above. The Station-to-Station Communications Interface (SSCI) serves as a gateway node interface to loop 4 of the ESM. It is used to simulate communications between different system control sites. The SSCI performs code conversion (ASCII-BCL), intransit queuing, and packet routing.

[2.1.f, 2.1.g]

7.4.5.7 FIAC - The FIAC performs fault isolation. This is demonstrated by the generation of event reports (per 7.4.5.2, 7.4.5.3, and 7.4.5.6 above) and fault reports. Inter-FIAC communication is demonstrated by the use of a simulated remote FIAC (SDCA node). The Fault Isolation and Control Coordination (FIAC) module interprets event reports from measurement function modules or from other site FIAC modules for the purpose of isolating the equipment causing the detected fault condition. The FIAC displays error messages on the OCRI terminal.
[2.1.c, 2.1.d, 2.1.e, 2.1.f, 2.1.k]

7.4.5.8 SDCA - Using Mode 3 of the User Language demonstrate generation of event reports and measurement of a specific switch capabiltiy. This node requires the PDP11/40 in Loop 2 to generate inputs. The Switch Data Collection and Analysis (SDCA) module receives switch traffic data generated by swtiched (e.g., AUTODIN or AUTOVON) and performs loading assessments on this data to detect switch equipment saturation conditions. Error conditions are displayed on the OCRI terminal.
[2.1.a, 2.1.b]

7.4.5.9 SIG - Demonstrated by 7.4.5.2, 7.4.5.3, and 7.4.5.6 above. A VT52 CRT is connected to the SIG to provide visual indication of the SIG's operation. The Simulated Input Generator (SIG) is a microprocessor that generates inputs to the VSQC, DSQC, and BWBSA modules.
[2.1.a, 2.1.b]

7.4.6 PDP11V03 Used as a PDU [See Appendix 3 - RT11 System User's Guide DEC-11-ORGDA-A-d, Digital Equipment Corporation]

The PDP11V03 will be demonstrated as a Program Development Unit (PDU). This will serve as an introduction to the RT-11 Operating System. The MSCDM table and parameter modification capability will be demonstrated by changing a threshold value for the VSQC module. Commands will be entered on the VT52 Local CRT terminal. Utilities which will be demonstrated include:

EDIT - for text editing
PIP - for file handling
FOR - for FORTRAN compilers
LINK - for object file linking

7.4.7 Diagnostics

Loop 5 diagnostics for demonstrating the ability to isolate bad cards include:

LSICPU - for testing the LSI-11 processor
LSIMEM - for testing the LSI-11 memory
LIURAM - for testing the address comparison memory on the LIU
LIUBUF - for testing the LIU I/O buffers
LIUINT - for testing the LIU/LSI-11 (BLIUI) interface card

7.4.8 Variable Clock Rate

The variable loop clock rate is demonstrated by selecting external clock input on the clock generator board, connecting an external clock signal generator to the external clock plug, and demonstrating OCRI-DBMS communication.

7.4.9 IEEE 488 Interface [2.1.g]

The ability to interface equipment with an IEEE 488 interface to MSCDM will be demonstrated using the DEC IBV-11A interface card at the FIAC node. Reload the FIAC and OCRI nodes with the test programs. Measure a power supply with the Digital Volt Meter. Demonstrate that the measurement is printed on the OCRI terminal.

7.4.10 48 Hour Continuous Operation Test

The MSCDM will be operational for a continuous 48 hours. To conserve OCRI terminal paper, the event reporting function can be turned OFF. The operation of the system modules can be tested by periodically repeating procedure 4.5. Note that for completely testing the SSCI and SDCA functions, Loop 4 and the PDP11/40 of loop 2 will have to be made periodically operational and available.

8.0 MODIFICATION PROCEDURE REFERENCES

8.1 Software

8.1.1 To modify MSCDM Software refer to the "MSCDM Software Maintenance Manual Books 1-3".

8.1.2 For instructions on D.E.C. System Software and utilities refer to one or more of the following D.E.C. manuals.

1. "Introduction to RT-11"
2. "RT-11 System User's Guide"
3. "PDP-11 MACRO Language Manual"
4. "PDP-11 FORTRAN Language Manual"

8.2 Hardware

8.2.1 Refer to "MSCDM Hardware Maintenance Manual" for information on the Burroughs and D.E.C. hardware.

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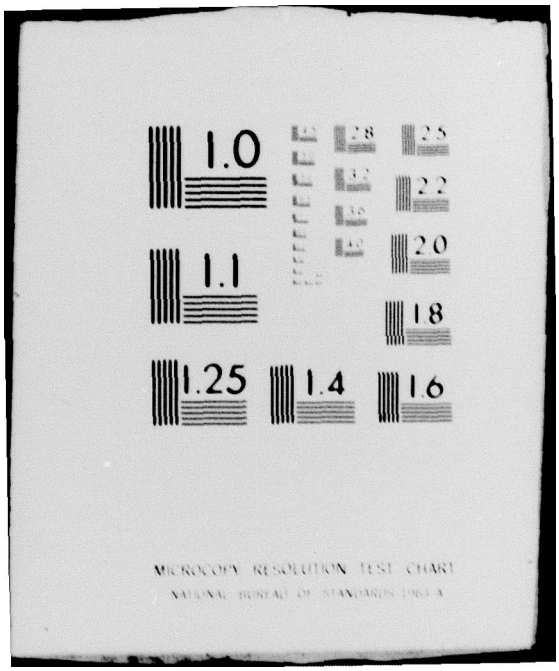
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APPENDIX A

GLOSSARY OF ACRONYMS

The interdisciplinary nature of the present study is emphasized by the large number of different acronyms, from diverse sources, that appear in the discussion. The following is a partial list of some of the relevant acronyms that have been identified. It also serves as a glossary.

ACAS	AUTOVON Centralized Alarm System
ACOC	Area Communications Operations Center
ADM	Adaptive Delta Modulation
ADO	Burroughs Advanced Development Organization
ASC	Automatic Swtiching Center (AUTODIN)
ASCII	American Standard Code for Information Interchange
ASCC	AUTODIN Station Control Console
ASSC	AUTODIN Station Supervisory Console
ASU	Alarm Scanner Unit
ATEC	Automated Tech Control
AVIE	AUTOVON Information and Evaluation Network
BARS	Buffered Automatic Reporting System
BBSA	Baseband Signal Analysis

BDLC	Burroughs Data Link Control
BLIUI	Bus Loop Interface Unit Interface
BWBSA	Combined functions of BBSA and WBSA
CCI	Command and Control Interpreter
CPU	Central Processor Unit
CRT	Cathode Ray Tube
DCA	Defense Communications Agency
DCAOC	Defense Communications Agency Operations Center
DCEC	Defense Communications Engineering Center
DCS	Defense Communications System
DBMS	Data Base Management Service
DDMS	Digital Distortion Monitoring Subsystem
DMA	Direct Memory Access
DSQC	Digital Service Quality Control
ESM	Exploratory System Control Model
ESMD	Exploratory System Control Model Development
FDM	Feasibility Development Model
FIAC	Fault Isolation and Analysis Coordination
IO	Input/Output
LA-36	DEC Hard Copy Terminal
LIU	Loop Interface Unit
MSCDM	Modular System Control Development Model
OCRI	Operator Control and Report Interface
PDU	Program Development Unit
PROM	Programmable Read Only Memory

RAM	Random Access Memory
SDCA	Switch Data Collection/Analysis
VSQC	Voice Service Quality Control
WBSA	Wideband Signal Analysis
WT	Write Token